OCTOBER, 1944

VOL. 3 No. 3

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INDUSTRIAL ARTS AND VOCATIONAL EDUCATION

PROJECTS NUMBER

Keep Wheels of Industry Rolling with KEMPSMITH *Standard* ATTACHMENTS

Heavy Duty Universal
Heavy duty angular milling in all planes. (Bulletin No. 104)

Circular Table
Milling circles or cams, gear cutting, high-speed continuous milling, etc. (Bulletin No. 108)

Hi-Speed Universal
High speed angular milling in all planes. (Bulletin No. 113)

Slotter
Keyseating, broaching, general slotting, tool and die making, etc. (Bulletin No. 107)

Vertical Head
Converts horizontal to vertical machine, retaining identical spindle characteristics. (Bulletin No. 105)

Dividing Head
Precision indexing. Spiral cutting mechanism and chuck also available. Bulletin 119.

Arbors and Accessories
A full range for standardized spindles carried in stock. (Bulletin No. 116)

Vises
Standard and Heavy-Duty, plain and swivel types. Adaptable to special jaws to save fixtures. (Bulletin 117)

Convert your general duty milling machine to a special purpose miller by utilizing Kempsmith Standard Attachments.

It's really surprising, the great variety of milling operations that can be handled by Kempsmith *Standard* Attachments mounted on a standard milling machine. The same high degree of rigidity and precision characteristic of Kempsmith Milling Machines for more than 56 years is embodied in these sturdy standard attachments. Thousands are serving industry, every day, performing the most delicate and accurate operations, or handling difficult production milling jobs.

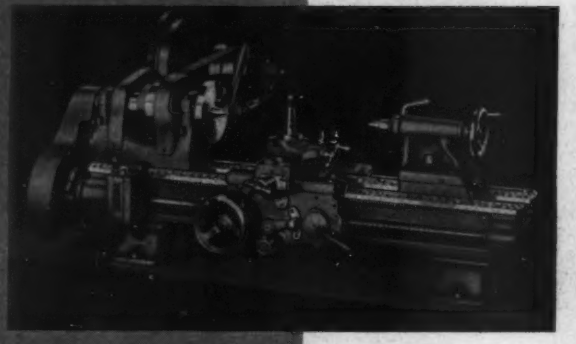
So plan now on broadening the scope of YOUR milling machines by applying Kempsmith Standard Attachments. Write for bulletins designated above.

THE KEMPSMITH MACHINE CO. • Milwaukee 14, Wis., U. S. A.

KEMPSMITH

• *Precision Built Milling Machines Since 1888* •

SOUTH BEND LATHES



SOUTH BEND 9"
MODEL B BENCH LATHE

For Post-War Retraining and Refresher Courses

Now is the time to prepare for post-war retraining and refresher courses. Many men now in service have never known peace-time employment. Others will need refresher courses on today's modern machines. Some, because of disabilities, may have to change their skills—will require new training. If retraining and instruction are to be effective, obsolete and worn equipment should be replaced. Peace-time competition will call for modern machinery.

The wide use of South Bend Lathes in industry makes them practical for retraining and refresher courses. They are modern in design—known for their unfailing precision and dependable performance. Their easily operated controls, safety features and versatility make it easier for beginners to acquire a working knowledge of metal turning in a short time.

There is a South Bend Lathe for almost every training requirement. Made in five sizes: 9" to 16" swing. Write for our latest catalog, just off the press.

GET THESE TRAINING HELPS

South Bend can help in your post-war training plans with books, sound films, wall charts and bulletins on the care and operation of lathes. All are available to instructors. Write today for circular No. 21-D describing these training helps.

BUY WAR BONDS — SAVE FOR LATHES

SOUTH BEND LATHE WORKS

LATHE BUILDERS FOR 37 YEARS • SOUTH BEND 22, INDIANA

Let these guys start it!

Official U. S. Signal Corps Photo

There's a day coming when the enemy will be licked, beaten, whipped to a fare-thee-well—every last vestige of fight knocked out of him.

And there's a day coming when every mother's son of us will want to stand up and yell, to cheer ourselves hoarse over the greatest victory in history.

But let's not start the cheering yet.

In fact, let's not start it at all—over here. Let's leave it to the fellows who are *doing* the job—the only fellows who will *know* when it's done—to begin the celebrating.

Our leaders have told us, over and over again, that the smashing of the Axis will be a slow job, a dangerous job, a bloody job.

And they've told us what our own common sense confirms: that, if we at home start throwing our hats in the air and easing up before the job's completely done, it will be slower, more dangerous, bloodier.

Right now, it's still up to us to buy War Bonds—and to *keep on* buying War Bonds until this war is completely won. That doesn't mean victory over the Nazis *alone*. It means bringing the Japs to their knees, too.

Let's keep bearing down till we get the news of final victory from the only place such news can come: the battle-line.

If we do that, we'll have the *right* to join the cheering when the time comes.

Keep backing 'em up with War Bonds

INDUSTRIAL ARTS AND VOCATIONAL EDUCATION

This is an official U.S. Treasury advertisement—prepared under auspices of Treasury Department and War Advertising Council.

GENUINE PARTS

for Black & Decker Tools are never far away

BENCH GRINDERS

VALVE SEAT GRINDERS

ELECTRIC SANDERS

VALVE REFACERS

Factory Service Branches in 25 Cities* Help Keep School Tools on the Job

Here's some of the added satisfaction you get with every Black & Decker Electric Tool. If and when repairs are needed, expert service is quickly available . . . through company-owned Factory Service Branches in the 25 cities listed below.

These Branches carry genuine Black & Decker parts in stock . . . use no substitutes or makeshifts . . . and that's mighty important. For example, genuine Black & Decker armatures, wound and dynamically balanced with our factory precision, can help you avoid burnouts that frequently result from hit-or-miss rewinding jobs.

This Factory Service, all over the map, is one of many reasons why Black & Decker Tools are a better buy for all such work as drilling and tapping, screw driving and nut running, sanding and grinding, sawing wood and cutting sheet metal.

Next time you buy tools, get the extra satisfaction that comes with every product of Black & Decker . . . world's largest manufacturer of portable electric tools. And for help in selecting tools for training, call your nearby Black & Decker Distributor. He's a ready source of information and supply. The Black & Decker Mfg. Co., 680 Pennsylvania Avenue, Towson 4, Maryland.

*FACTORY SERVICE BRANCHES: Atlanta, Ga.; Baltimore, Md.; Boston, Mass.; Buffalo, N. Y.; Chicago, Ill.; Cleveland, Ohio; Dallas, Texas; Denver, Colo.; Detroit, Mich.; Indianapolis, Ind.; Kansas City, Mo.; Los Angeles, Calif.; Memphis, Tenn.; Minneapolis, Minn.; Newark, N. J.; New Orleans, La.; New York, N. Y.; Philadelphia, Pa.; Pittsburgh, Pa.; San Francisco, Calif.; Seattle, Wash.; St. Louis, Mo.; Towson, Md.; Toronto, Ont.; Montreal, Que.

LEADING DISTRIBUTORS EVERYWHERE SELL

Black & Decker

PORTABLE ELECTRIC TOOLS

Take the "GUESS" Out of Inspection

Check Your Gages Daily

That's one of the first rules in industry today and to keep up with this modern trend, every school shop should include a course in the use of Gage Blocks and precision instruments.

DoALL GAGE BLOCKS

The modern key to exactness and precision in experimental laboratory, tool room and on production lines. To take care of every gage block need, DoALLS are furnished in 3 different accuracies:

Laboratory Set ± .000002" (2 millionths of an inch)
Inspection Set ± .000004" (4 millionths of an inch)
Working Set ± .000008" (8 millionths of an inch)

FREE TO TEACHERS — Handbook of Scientific Inspection. Tells about the many uses and advantages of DoALL Gage Blocks. Just write for a copy of "QUALITY CONTROL."

CONTINENTAL MACHINES, INC.
Manufacturers of DoAll Contour Machines and Surface Grinders.
Offices in Principal Cities
1362 S. WASHINGTON AVE. MINNEAPOLIS, MINN.

AUTO SHOP INSTRUCTORS!

Put This "AUTOMATIC TEACHER" to Work for You!

WITH THIS FAMOUS DATA BOOK AND INSTRUCTION MANUAL YOUR STUDENTS CAN REPAIR ANY CAR BUILT SINCE 1935!

HERE, in one big book, are the auto repair facts and instructions needed by the student mechanic, apprentice, and veteran repair expert in helping to maintain essential war transportation! And it's yours to examine FREE for ten days! See for yourself how it simplifies repair problems — puts plenty of "know-how" right at your student's fingertips, so that he doesn't have to run to you with every question! *Teach him how to get the most out of the great auto repair manual he will use when he takes an actual job in an auto repair shop!*

Official, quick-indexed instructions on Engine Overhaul; Electric, Fuel, Cooling, Lubrication Systems; Tune-Up; Transmissions; Clutch; Universals; Rear End; Wheels; Brakes; Shock Absorbers; Steering; Springs; Body; etc., etc. — *every* part of *every* model!

SEND NO MONEY

To examine MoToR's AUTO REPAIR MANUAL *free* for ten days, send your name, address, and school title—*without* money. No obligation, and unless you are convinced, after examination, of the book's instructional and on-the-job value, return it in 10 days and pay nothing. Otherwise, keep it and send only $5 (we pay delivery charge) less special 10% school discount. Address Free Examination request *today* to: *MoToR Book Dept., Desk 36E, 572 Madison Avenue, New York 22, N. Y.*

MoToR's AUTO REPAIR MANUAL

Standard Trade Authority for Service and Repair of All Cars, 1936 - 1942

- **200,000 Facts from 150 Official Factory Books**
- **640 pages, 1000 pictures**
- **Used by U. S. Army, Navy, etc.**
- **Complete data and instructions on service and repair of all these makes:**

American Bantam	Ford	Oldsmobile
Auburn	Graham	Overland
Austin	Hudson	Packard
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Chrysler	Lincoln	Pontiac
Cord	Lincoln Zephyr	Reo
De Soto	Mercury	Studebaker
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		Willys

Companion Volume Covers All Jobs on 10,000 Truck Models

MoToR's TRUCK REPAIR MANUAL

A quick-indexed data and instruction manual, ideal for student mechanics, equally valuable to veteran truck repair experts. Over 900 pages, 1400 pictures and diagrams, 300,000 essential facts based on manufacturers' own official manuals. Used by U. S. Army! Covers EVERY job on EVERY truck made since 1936! All 287 makes and models of Gasoline Engines; all types of Diesels—Buda, Cummins, Dodge, GMC, Hercules, Mack, The Waukesha-Hesselman. All types of Diesel Fuel Injection Systems. Governors, Transmissions, Transfer Cases, Torque Dividers, etc., etc.

Offered to you on same FREE Ten Day Examination offer as the Auto Repair Manual. If you decide to keep this big book, send only $4 (we pay delivery charge) less 10% school discount. Address Free Examination request to *MoToR Book Dept., Desk 36M, 572 Madison Avenue, New York 22, N. Y.*

INDUSTRIAL ARTS AND VOCATIONAL EDUCATION, October, 1944, Volume 33, No. 8. Published monthly, except during July and August, by The Bruce Publishing Co., Milwaukee 1, Wis. Entered January 2, 1914, as Second-Class Matter at Milwaukee 1, Wis., under Act of March 3, 1879. Subscriptions — U. S., $2.50 per year. Canada and Foreign, $3.00. Single copies, 35 cents.

Building for a Future

After the hectic pace of the last few years, industrial arts teachers have time to glance back at the record—and a magnificent record it is, established in spite of many difficulties.

And they are looking to the big period ahead . . . planning and organizing for the days of larger classes that are bound to come.

Clear, crisp organization takes paper work, and when there is paper work to do, the Mimeograph* duplicator is a magic weapon. Use it freely now, to help you get your plans down in black and white. Make it an essential part of your plans for the future.

As has been proved repeatedly in the period just past, Mimeograph equipment—the Mimeograph duplicator and Mimeograph brand stencil sheets and inks—is an efficient assistant to hard-working teachers. A. B. Dick Company, Chicago.

Mimeograph duplicator

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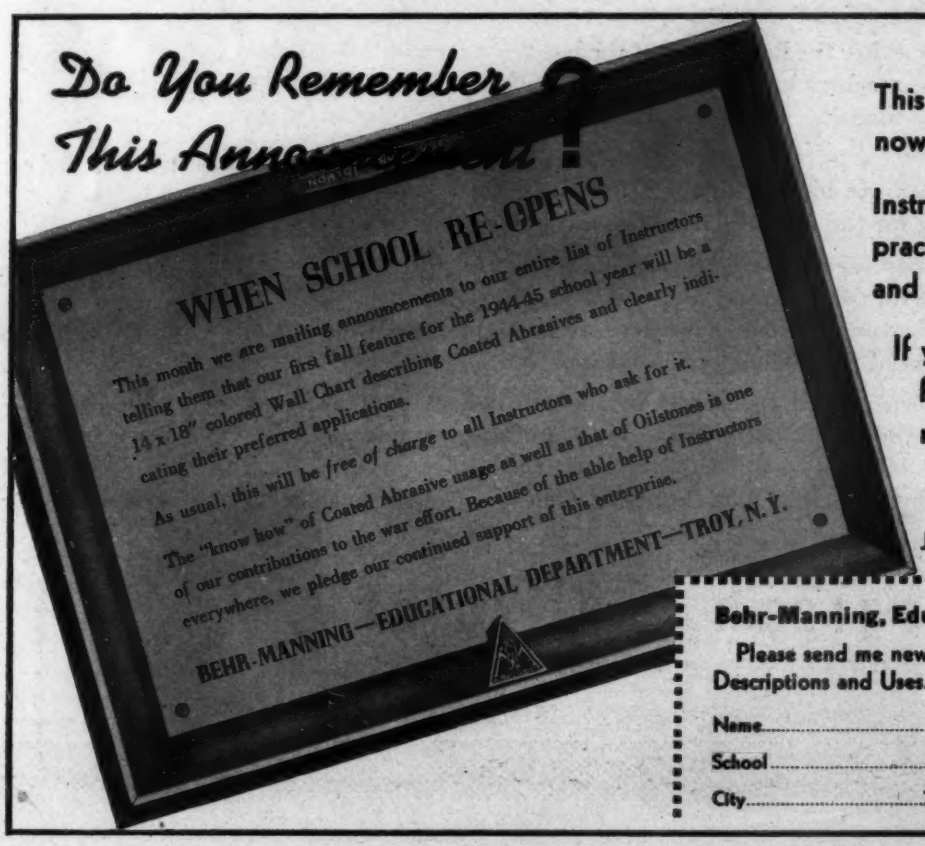
THE WORK-HABITS of a lifetime are established during the formative training years! Speed, accuracy and confidence in the use of hand tools can only be developed with *modern tool equipment* . . . the type of tools that are used in top industrial plants for production, assembly and maintenance operations . . . *the only kind* a good mechanic will consider in making his own tool investments. To vocational schools everywhere Snap-on tool service is available through 37 factory branches. Write for catalog of the complete Snap-on line.

SNAP-ON TOOLS CORPORATION

8074-J 28th Avenue Kenosha, Wisconsin

Do You Remember This Announcement?


WHEN SCHOOL RE-OPENS
This month we are mailing announcements to our entire list of Instructors telling them that our first fall feature for the 1944-45 school year will be a 14 x 18" colored Wall Chart describing Coated Abrasives and clearly indicating their preferred applications.
As usual, this will be free of charge to all Instructors who ask for it.
The "know how" of Coated Abrasive usage as well as that of Oilstones is one of our contributions to the war effort. Because of the able help of Instructors everywhere, we pledge our continued support of this enterprise.
BEHR-MANNING—EDUCATIONAL DEPARTMENT—TROY, N.Y.

This fine Service Chart is now ready!

Instructors will find it a practical aid for both shop and classroom use.

If you have not yet sent for your copy—why not do so now.

•

JUST USE THIS COUPON

Behr-Manning, Educational Dept., Troy, N.Y.

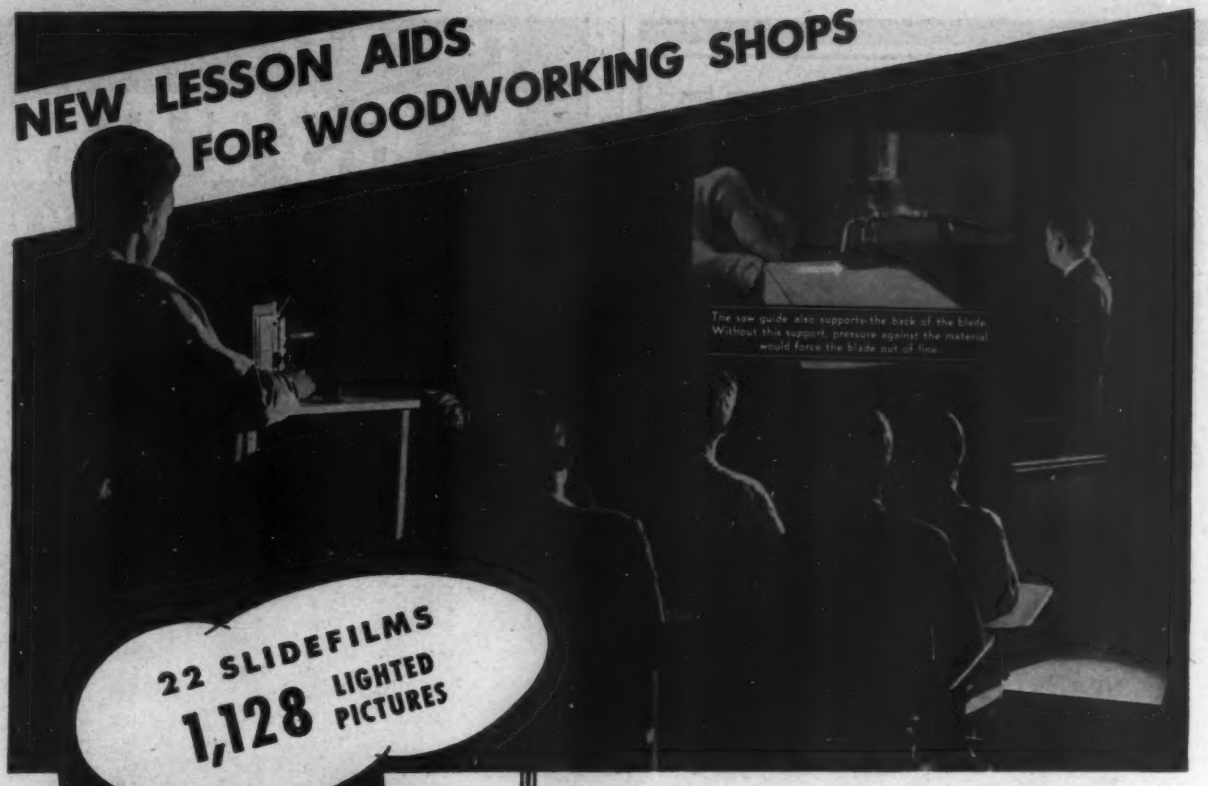
Please send me new free chart, "Coated Abrasives Descriptions and Uses."

Name.....

School.....

City..... Zone..... State.....

NEW LESSON AIDS FOR WOODWORKING SHOPS


The saw guide also supports the back of the blade. Without this support, pressure against the material would force the blade out of line.

22 SLIDEFILMS
1,128 LIGHTED PICTURES

Instructional Program of
SAFE PRACTICES IN WOODWORKING
Instruction — Review — Test

WOODWORKING TOOLS AND MACHINES

1. Hand Tools—Hammers—Saws
2. Planes—Bits—Knives—Chisels—Screwdrivers—Files
3. Tool Grinder
4. Drill Press
5. Jig Saw
6. Band Saw
7. Disk Sander
8. Belt Sander
9. Lathe—Parts—Spindle Turning
10. Lathe—Faceplate Turning—Other Operations
11. Planer
12. Jointer
13. Circular Saw—Parts—Installing Blade
14. Circular Saw—Setting Up—Operating

BASIC SAFETY

1. Play Safe and Work Safely
2. Maintaining a Safe Shop
3. Safety Inspection
4. Training for Emergencies
5. Treatment for Bleeding—Shock—Preventing Infection
6. Aid for Injuries—Fainting—Burns
7. Eye Protection
8. Power Supply

THIS COMPLETE KIT-SET

$81.60
f.o.b. DETROIT

Specially Planned . . . Specially Designed to Help Teach Basic Safety and Shop Work in Schools . . . Each film contains 50 to 75 clear, carefully planned, graphic illustrations and descriptions, arranged in lessons—ready to teach. Each lesson concludes with a complete set of pointed review and test questions that fix a visual pattern for each topic in the student's mind.

These discussional slidefilms are specially prepared for school use. They are direct and effective teaching aids, based on up-to-date shop practices.

SOME ADVANTAGES OF USING SLIDEFILMS IN TEACHING

★ Lighted illustrations—clear, sharp photographs or simple, graphic, professional drawings, done by experts—help teachers simplify and clarify the most complicated topics.

★ Pictures of small and intricate parts are shown in close-ups—greatly enlarged—so that all can see.

★ Pictures can be projected as long as needed . . . or changed as quickly as desired.

Produced by
The JAM HANDY Organization

10-DAY TRIAL

This Jam Handy Kit-set is sold on a ten-day trial. See for yourself!

FILL OUT COUPON AND MAIL—TODAY!

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Please enter our order for the Woodworking Kit-set.

Name_____

Position_____

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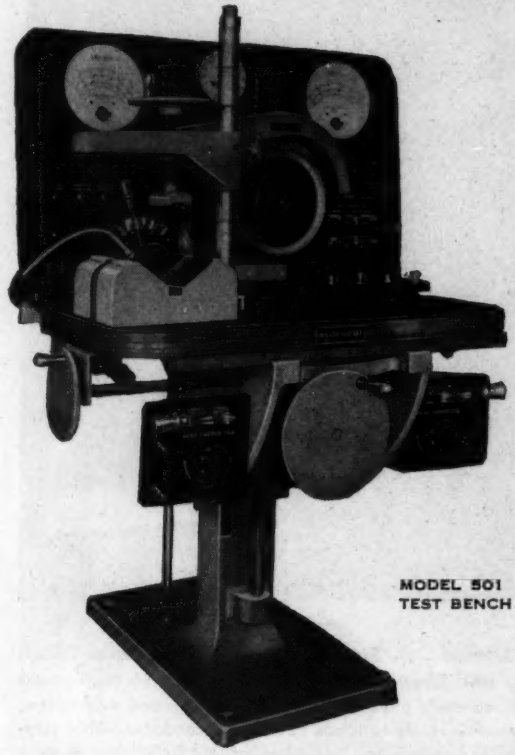
WRITE FOR CATALOG OF SLIDEFILMS ON OTHER SUBJECTS

WEIDENHOFF



MODEL 501
TEST BENCH

Automotive Service Equipment in Schools

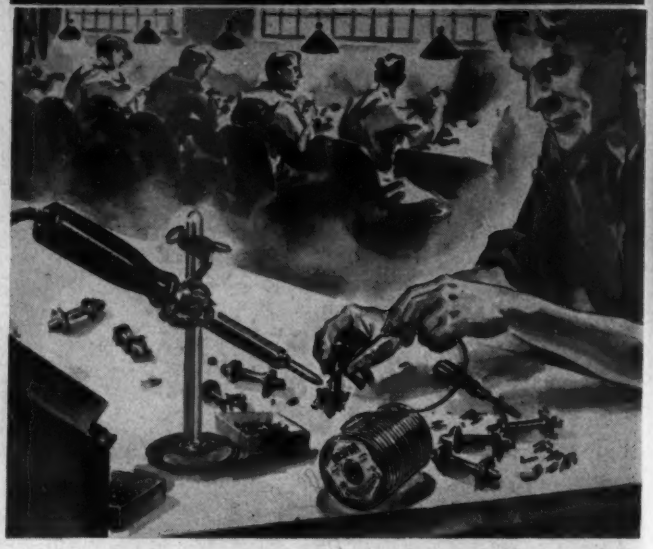
● Much of present Weidenhoff production is going to the armed forces today, but delivery of certain items can be made to schools now.

● Since schools will be training more and more students now and in the postwar years, why not install the equipment they will encounter in actual practice? Thousands of returning servicemen from the armed forces will have used Weidenhoff equipment and your school will gain immeasurably by having the same equipment for teaching the latest, practical and precision methods of servicing automotive units.

● Determine your requirements and write for our latest catalogs and delivery information.

Joseph Weidenhoff, Inc. Chicago 24, Illinois

TEACH THEM WITH KESTER
THE SOLDER THEY'LL USE ON THE JOB



• Teach your classes soldering with KESTER — the flux-filled, easy-to-use solder that's industry's standard. Knowledge of Kester Flux-Filled Solders and how to use them will be permanently valuable to your students now or in postwar jobs.

• Classes learn soldering quickly with KESTER. They turn out better work, because flux and solder are both applied in one simple operation. No separate, messy flux to make the work hit-or-miss — or to spatter the walls, floors and benches in your school shop.

• Standardize on Kester for school shop soldering projects. You'll be giving your classes **practical** instruction in using the technique and material of industry itself. Order from your wholesaler.

★ BUY WAR BONDS ★

KESTER SOLDER COMPANY

4257 Wrightwood Avenue,
Chicago 39, Ill.

Eas'ern Plant: Newark, N. J.

Canadian Plant: Brantford, Ont.

Finest Quality FOR 45 YEARS KESTER SOLDER

KESTER
FLUX-FILLED SOLDER

PREFERRED BY LEADING EDUCATIONAL INSTITUTIONS

PARTIAL LIST OF *Milwaukee* INSTALLATIONS IN EDUCATIONAL AND VOCATIONAL INSTITUTIONS

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CALIFORNIA
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University of California — Berkeley
Senior High School — Burbank
— Compton
— Davis
El Cerrito
Santa Ana
Board of Education — Santa Barbara
Santa Monica Technical School — Ventura
Ventura Junior College

COLORADO
Colorado Springs
Denver
Pueblo

CONNECTICUT
Manchester
Manchester Trade School
New Haven Defense Training Center No. 1 — New Haven
— New London
— Stamford
— Waterbury

GEORGIA
Georgia School of Vocational School — Milledeville
Georgia Training School for Boys

ILLINOIS
Charleston
Chicago
Thornton Township High Junior College — Harvey
Joliet Township High School — Joliet
Lockport Township High School — Lockport
Moline Board of Education — Moline
Bradley Polytechnic Institute — Peoria
Rock Island Board of Education — Rock Island
National Defense Training School — Rockford
Rockford Senior High School — Rockford
Board of Education—East High School — Sterling
Sterling Township High School — Urbana
University of Illinois — Woodstock
Woodstock High School

INDIANA
Alexander Junior-Senior High School — Alexandria
Board of Education — Columbus
Washington High School — East Chicago
Board of Education — East Chicago
Mechanic Arts School — Evansville
Board of Education —
School City of Gary — Gary
Arsenal Technical High School — Indianapolis
Manual Training High School — Indianapolis
Purdue University — Lafayette
University of Notre Dame — Notre Dame
Peru High School — Peru
Vocational Education Dept. — South Bend
Gerstmeyer Tech. High School — Terre Haute
Indiana State Normal — Terre Haute
School City of Whiting — Whiting

IOWA
Iowa State College — Ames
Davenport Public Schools — Davenport

KANSAS
Labette Co. Community High School — Altamont
Kansas State Agricultural College — Manhattan
Topeka Public Schools — Topeka
Wichita High School — Wichita

KENTUCKY
Theo. Ahrens Trade School — Louisville

LOUISIANA
Orleans Parish School Board — New Orleans
Sullivan Memorial Trade School — New Orleans

MASSACHUSETTS
Beverly High School — Beverly
Boston Teachers College — Boston
Brookline Manual Training — Brookline
Mass. Institute of Technology — Cambridge
East Boston High School — East Boston
Holyoke High School — Holyoke
Hyde Park High School — Hyde Park
Lawrence Industrial School — Lawrence
Medford Vocational School — Medford
Vocational School — New Bedford
Worcester Boys' Trade School — Worcester

MICHIGAN
Battle Creek
Detroit
Flint
Grand Rapids
Kalamazoo
Lansing
East Lansing
Muskegon
Jackson
Central High School
Western State Teachers College
Boys Vocational School
College

NEW HAMPSHIRE
Manual High School
Cleveland High School
Missouri School of Mines & Metallurgy — Rolla
College of Agr. — Durham
Durham

NEW JERSEY
Central High School
Rutgers University

NEW YORK
New Technical High School — Auburn
Union Free School District — Batavia
Batavia Metal Trades Vocational — Batavia
North Senior High School — Binghamton
Peckham Vocational School — Buffalo
McKinley Vocational School — Buffalo
Vocational School No. 10 — Dunkirk
Elmira Aviation Ground School — Elmira Heights
Sewhanaka High School — Floral Park
Queens College — Flushing
Board of Education — Hastings upon Hudson
State Agricultural School — Industry
Jamaica Continuation School — Jamaica, L. I.
Vocational School — Kingston
Newton High School — Long Island City
Masena High School — Masena
Textile High School — New York
Queens College — New York
Auburn High School — New York
Bronx Vocational School — New York
Franklin K. Lane High School — New York
E. New York Vocational High School — New York
Geo. Hall Trade School — Ogdensburg
Olean Public Schools Dept. — Olean
Ind. Relation — Rochester
University of Rochester — Rochester
Rochester Shop School — Saranac Lake
Saranac Lake Public School — Staten Island
Staten Island Vocational School — Syracuse
Continuation School

NORTH CAROLINA
University of North Carolina — Chapel
Duke University — Durham

OHIO
Mower Vocational High School — Akron
Timken Foundation of Canton — Canton
East Technical High School — Cleveland
West Technical High School — Cleveland
Collinwood High School — Cleveland
Case School of Applied Science — Cleveland
Cuyahoga Heights School — Cleveland
Perkins Observatory — Delaware
Herding High School Vocational Shop — Fremont
Washington High School — Massillon
Toledo Vocational School — Toledo
Woodward High School — Toledo
Waite High School — Toledo

OKLAHOMA
University of Oklahoma — Norman
Oklahoma City Trade School — Oklahoma City
Board of Education — Ponca City
Daniel Webber High School — Tulsa
New High School — Tulsa

OREGON
Jefferson High School — Portland
— Portland

PENNSYLVANIA
— Allentown
— Ardmore
— Bethlehem
— California
— Carlisle
— Chester
— Franklin
Franklin High School —
McCaskey High School — New Castle
Benjamin Franklin Jr. High School — New Castle
Trade School — New Kensington
— New Kensington
— Philadelphia
— Philadelphia
— Philadelphia
— Pottstown
— Reading
Reading High School — State College
Pennsylvania State College — Wilkes-Barre
G.A.R. High School — Wilkes-Barre
— Wilmerding
— York
— York

UTAH
Ogden High School — Ogden
Educational Institution—Carbon College — Price
Central Utah Vocational School — Provo
Union Bldg. — Salt Lake City

VIRGINIA
Stonewall Jackson High — Charleston
Huntington High School — Huntington
West Virginia University — Morgantown

WASHINGTON
Bremerton Vocational School — Bremerton
Defense Training School —
R. A. Long High School — Longview
Seattle-Edison Vocational School — Seattle
Tacoma Vocational School — Tacoma

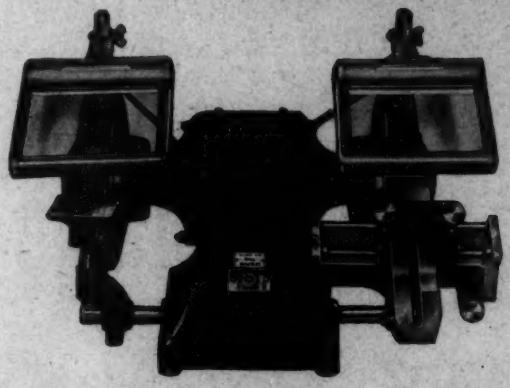
WISCONSIN
Beloit Vocational School — Beloit
Fond du Lac Vocational School — Fond du Lac
Fond du Lac Public Schools — Fond du Lac
Green Bay Vocational School — Green Bay
Janesville Vocational School — Janesville
Kaukauna Vocational School — Kaukauna
Kenosha Vocational School — Kenosha
West High School — Madison
Madison Vocational School — Madison
Marinette Vocational School — Marinette
Boys Vocational School — Milwaukee
Milwaukee Vocational School — Milwaukee
— Neenah
— Oshkosh

Write for literature and complete information.

Kearney & Trecker
CORPORATION
Milwaukee 14 **Wisconsin**

Milwaukee Machine Tools

RIGHT GRINDING EQUIPMENT



THE STANLEY No. 677 GRINDER

A *safe* edge tool grinder especially designed for school shops. Makes it easy to teach proper grinding of Plane Irons and Chisels.

Equipped with 1725 R.P.M. heavy duty fully enclosed motor, dust sealed ball bearings, guarded wheels, plane iron and chisel grinding fixture, "FLUD-LITE" Safety Eye Shields. Write for specifications.

. . . for your present Tool Grinders . . .

Assures effective eye protection, better vision, and improved work. Two light bulbs with reflectors flood-light the work, provide *30% more visibility.*

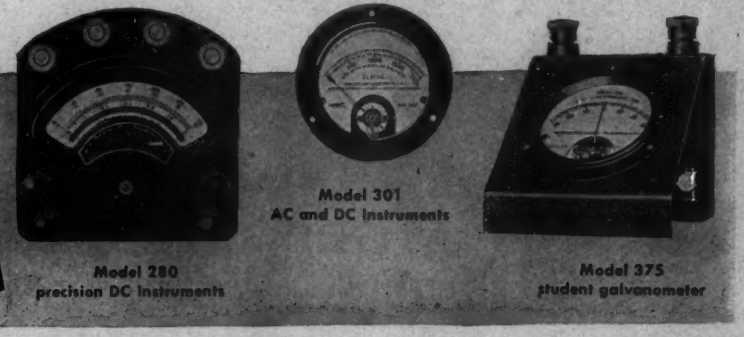
Adjustable, to suit operator's position . . . cannot be moved to non-guarding position. Can be attached to any grinder equipped with wheel guards. Ask your Stanley distributor, or write for details.

STANLEY

STANLEY *Electric* TOOLS

EDUCATIONAL DEPARTMENT, STANLEY ELECTRIC TOOL DIVISION
THE STANLEY WORKS, NEW BRITAIN, CONN.

WESTON
measurement
dependability
at low cost
. . . for instruction
and research



Model 280 is a rugged and extremely compact precision instrument for DC testing. Has hand calibrated mirror scale with knife edged pointer. Magnetically shielded.

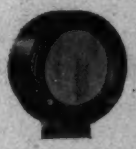
Model 301 group is the line of WESTON 3 inch panel meters long famous for their dependability and long life. Available for AC and DC and thermo AC requirements including power level indicators.

Model 375 galvanometer, too, provides the durability and low cost necessary for student training, wherever extreme sensitivity is not essential. Galvanometers of higher sensitivity also available.

The ruggedness of WESTON instruments suits them ideally for use by unskilled hands . . . and their use in the classroom familiarizes students with the instruments they will later use, during their industrial or engineering careers. Literature gladly sent on request.

Other WESTON School Favorites

All-Metal Laboratory Thermometers —with easy to read dial—rugged all-metal construction—accuracy within ½ of 1% full scale.



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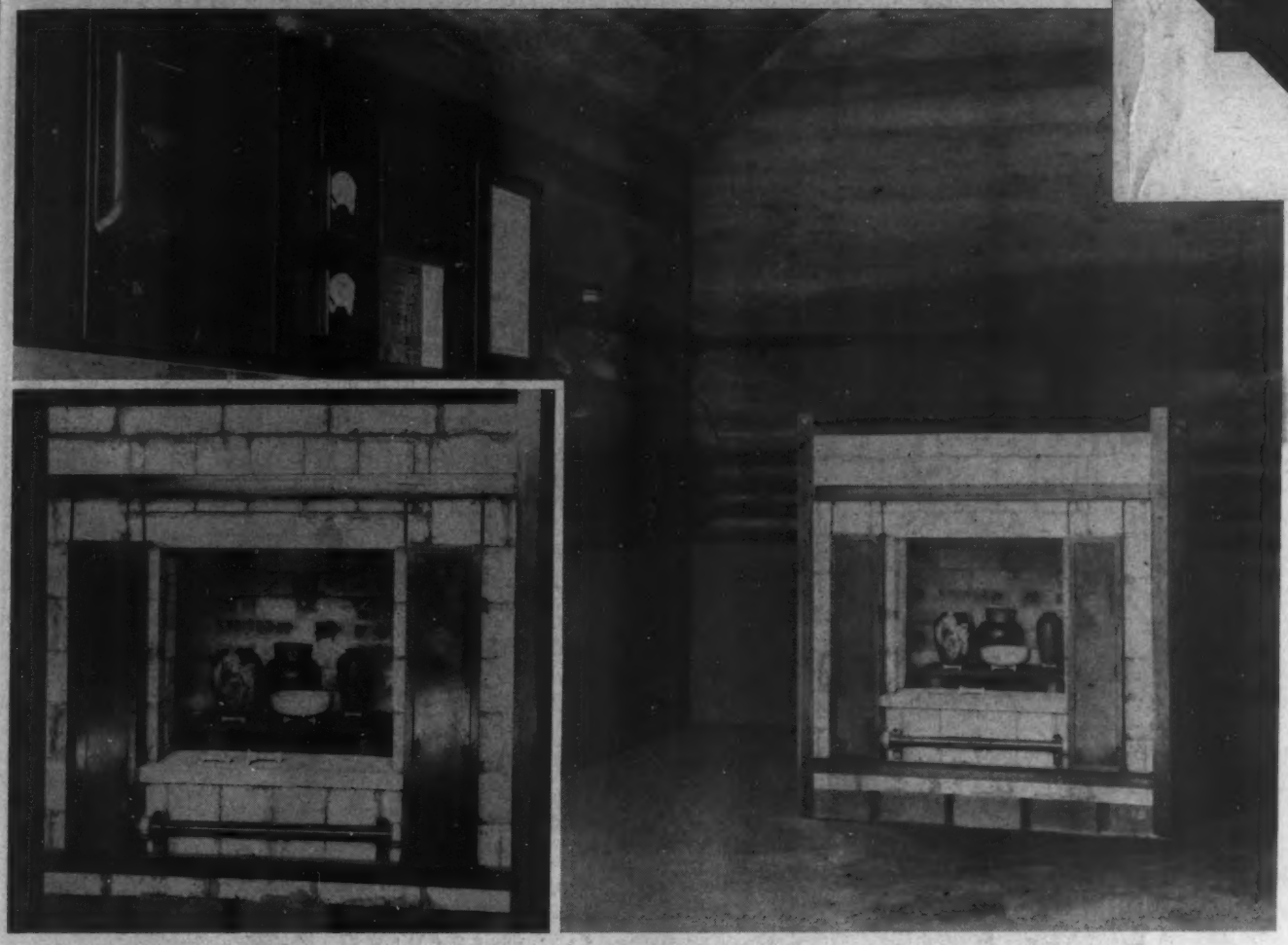

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Known the world over, among institutions of its type, is the famed Trudeau Sanatorium at Saranac Lake, New York.

Occupational therapy plays an all important part as an outlet for the tendencies and talents of many of the patients—an outlet that contributes materially to their cure.

One artistic group centers its interest in the creation of art pottery ware—and they entrust the firing of their precious pieces to a "Globar" equipped electric kiln.

They tell us that the little kiln performs admirably in turning out bisque and glost firings—it's so reliable—so easy to operate—and of importance is its economy.

The kiln loading zone is 18″ high, 21″ deep and 20″ wide.

It consumes 115 kilowatt hours of energy in firing to cone 03 down, in eight hours.

The kiln assures perfect temperature control—uniform firing under clean, fumeless conditions—all of which is conducive to the production of perfect ware.

Complete data on the operating characteristics of this kiln is available to those interested. The Carborundum Company, Globar Division, Niagara Falls, New York.

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Making sure that weapons are right before they leave the factory is a job that has been increasingly assigned to Millers Falls Precision Tools. That's why vocational training requires the use of these tools . . . the same tools that are needed to shape Victory.

The picture shows a few of the precision items in the Millers Falls wartime line. Details are available on request.

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The transition from tooling-up to all-out production has increased the need for turret lathe and screw machine operators. When preparing your courses to help fill this need it would be well to build them around ARMSTRONG TURRET LATHE and SCREW MACHINE TOOLS. These are provided for the basic operations, and take standard drills and knurls or cutters that anyone can quickly grind from stock shapes of high speed steel. Permanent, multi-purpose tools, they reduce tooling-up to the selection of cutters, adjustment for clearance and tightening of set screws.

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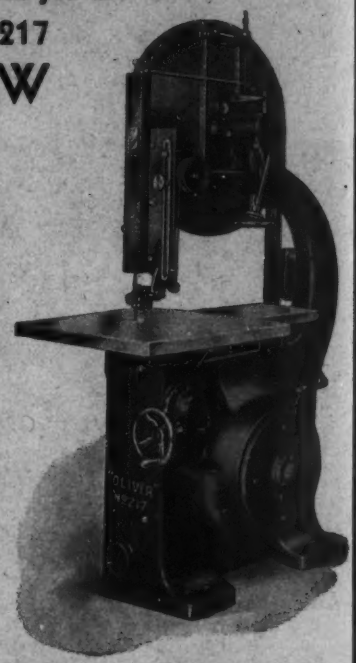

Some of the new features are the automatic brake for the upper wheel; the oil immersed, self-locking tilting device for the table; the foot brake which shuts off the current and stops the machine quickly and the dust collecting system.

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The only shaper having two different diameters of cutter-arbor formed on a solid, single piece of vanadium-steel, making it stronger, more accurate and safer than any 2-piece type. You merely invert the quill to change from one size to another.

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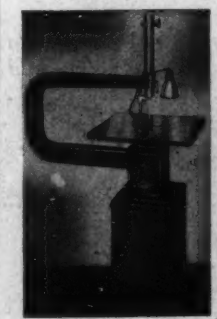

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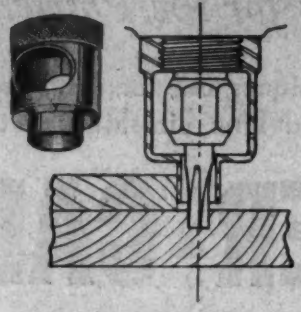

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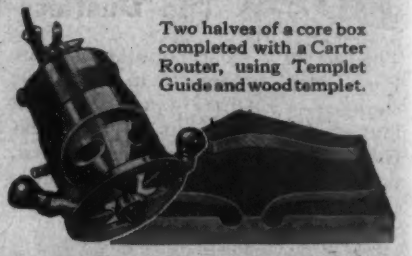

Two halves of a core box completed with a Carter Router, using Templet Guide and wood templet.

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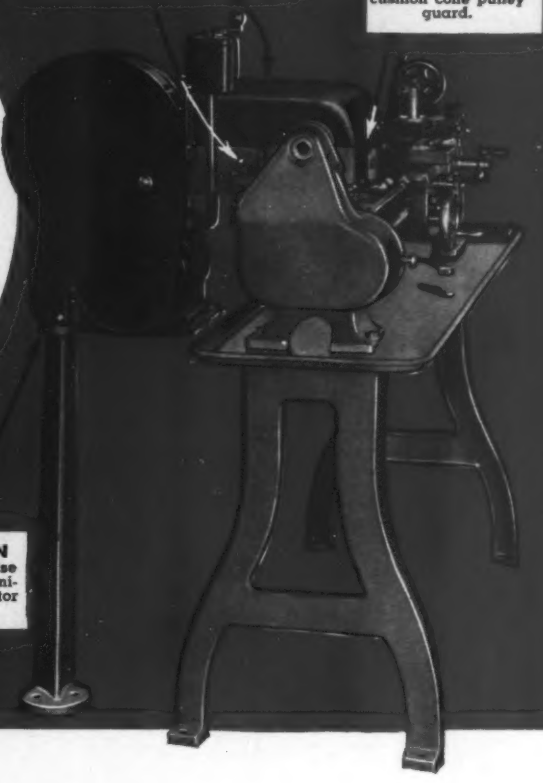
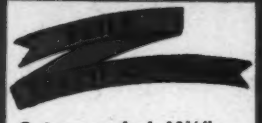


ONE RUBBER CUSHION between motor mounting base and pedestal further eliminates transmission of motor vibration.



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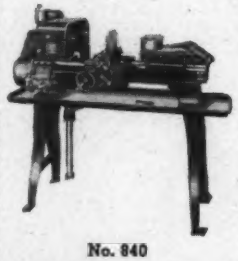

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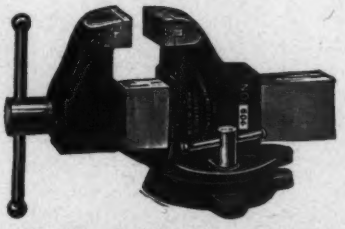

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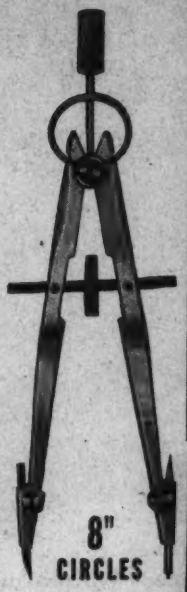

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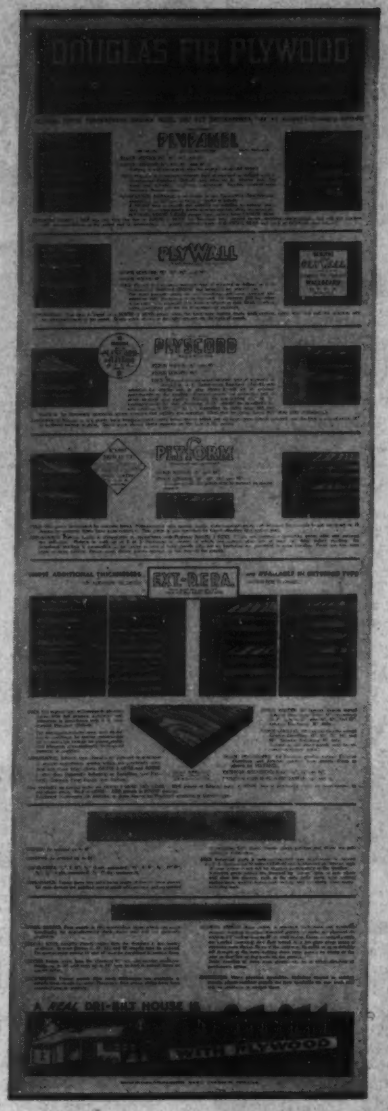

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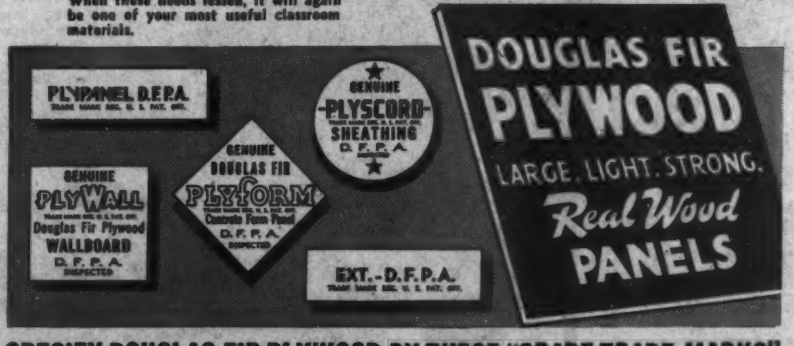
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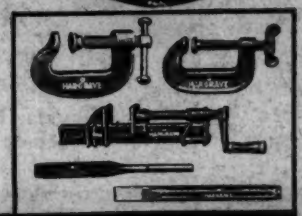

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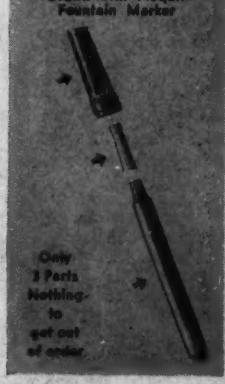

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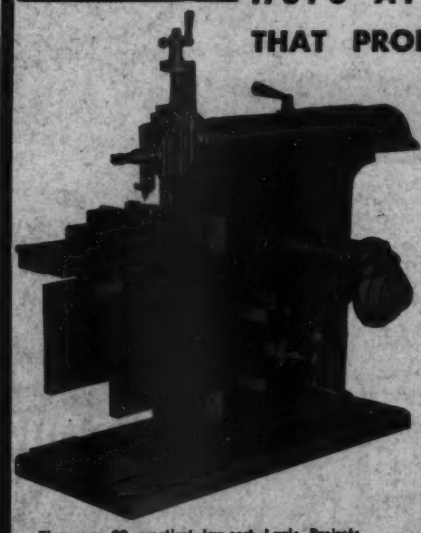

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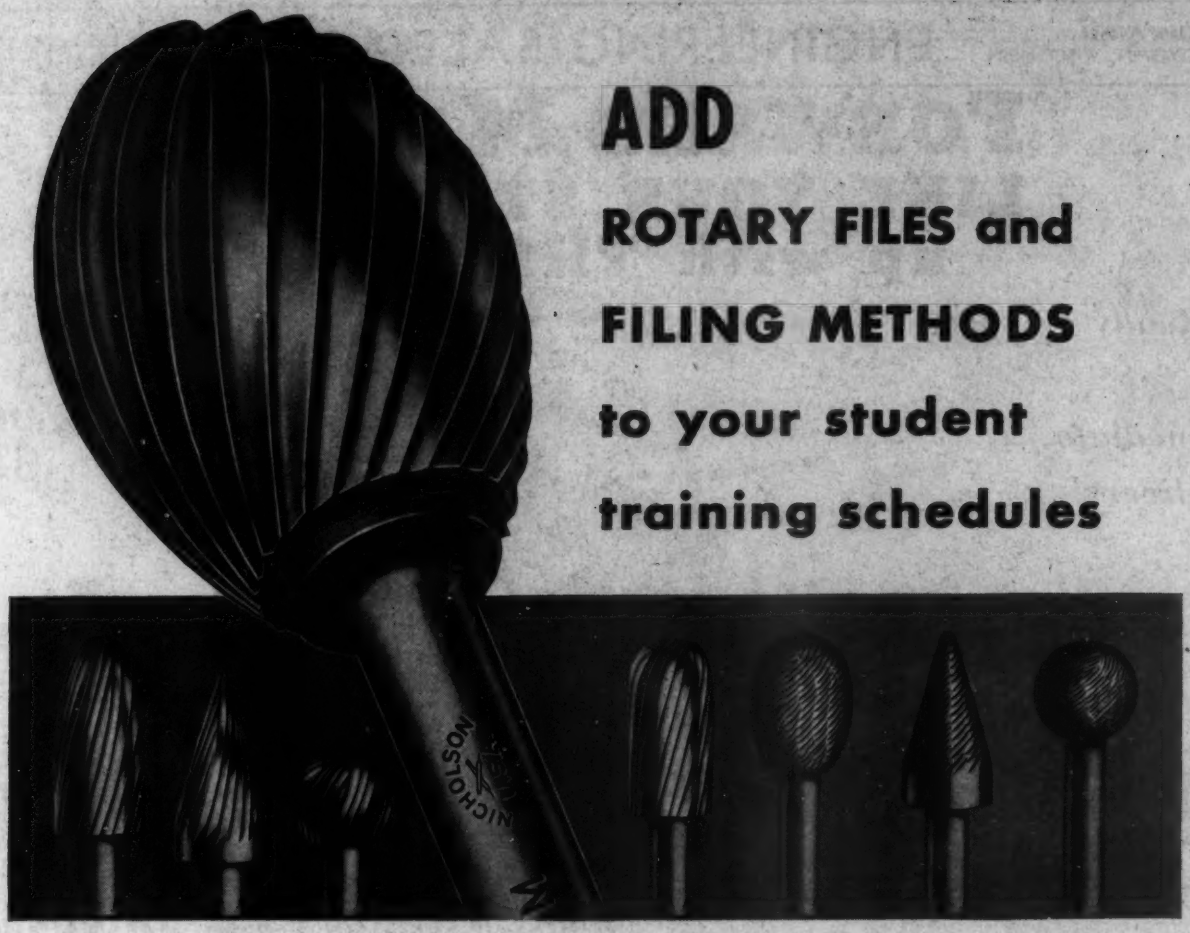

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INDUSTRIAL ARTS and VOCATIONAL EDUCATION

VOL. 33 OCTOBER, 1944 Number 8

In This Issue

The material offered this month contains a number of very helpful articles. Among them are the following:

Building a General Shop Curriculum, Establishing Vocational School Admission Standards, Teaching Materials for Industrial Education, and What Every New Worker Should Know About Safety.

Among the problems and projects there are a number that are of special interest to teachers of woodwork, drafting, electricity, printing, machine-shop practice, metalwork, farmshop, and general shop.

For the *woodworking* teacher there are:

Boatbuilding as an Industrial-Arts Course, Light Folding Chairs for the Armed Forces, Whittling-Jackknife Technique, How to Fold a Band-Saw Blade, A Simple Nail Cabinet, Towel Racks, Plane-Bit Cabinet for the Woodshop, and A Trick Marionette.

For the *drafting teacher* there are:

Making Lantern Slides by Tracing, Instrument Practice With Useful Geometrical Design for the Teacher of Industrial Arts, and Creative Design.

Electricity: A Useful Wiring Panel, 2½ Meter Walkie Talkie, and Test Table for Advanced Electrical Work.

Printing: A Tin Can Photoprint Washer, and Avoiding Mashed Forms.

Machine-Shop Practice: Twist Drill Stand, Filing Project, Bench Vise, Clamp, and Drill Jig, and Nonferrous Metals in the World of Tomorrow.

Metalwork: Radio Lamp, and Sheet-Metal Medicine Shelf.

Farm Shop: Applying Pneumatic Tires to Farm Machinery.

General Shop: Plastics in the Classroom.

This Month's Cover

The photograph for the picture chosen for this month's cover was taken at Southwestern High School, Detroit, Mich. The operator is student Joe Beretsel. Fred Decker is the instructor of the machine shop shown.

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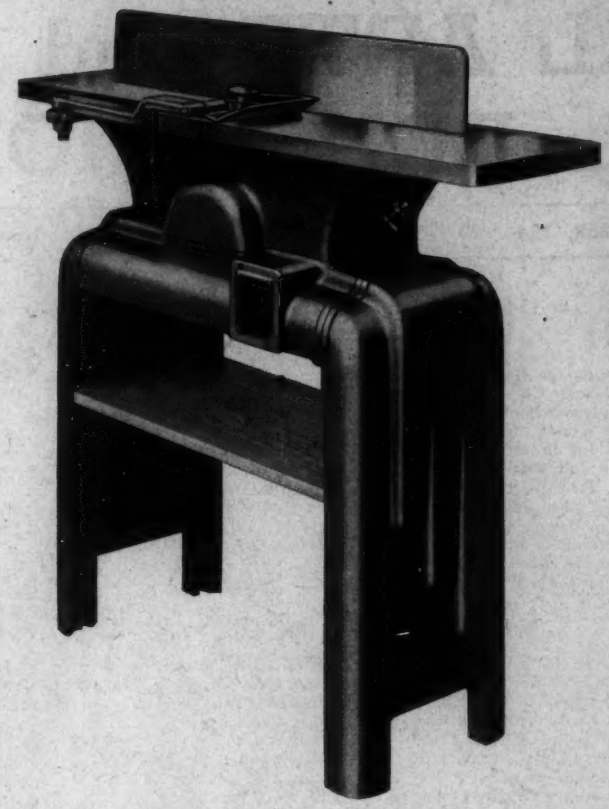

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No. 2 of a Series

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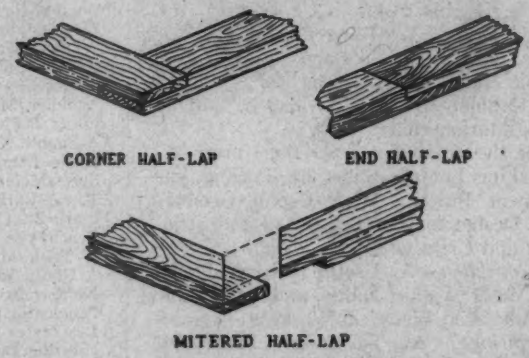

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European Influence on the

Industrial Education in the United States

DEYO B. FOX*

This study does not attempt to treat the subject exhaustively, but merely to show a vertical line of influence as educational thought and philosophy progressed through the centuries.

It has seemed desirable to begin this work with the influence of Rousseau, except for just a glimpse of the work of the men who preceded him, and who no doubt were somewhat responsible for his educational philosophy.

The Babylonian Code of Hammurabi (about 2250 B.C.) shows that apprenticeship was practiced in those early times with the accompanying practice of paternal relationship between master and apprentice which continued down to the beginning of the factory system in the nineteenth century.

During the Homeric Age in Greece, handicraft held a place of respect but by the time of Socrates (470–399 B.C.) handwork had lost its place and was looked down upon as training for Greek youth. The Benedictines in Italy about A.D. 529 made manual labor one of their objectives of education.

The work of Rabelais (1483–1553) cannot be considered important educationally except as it exerted influence on Montaigne, Locke, Rousseau, and Pestalozzi many years later.

Comenius and Locke

John Comenius (1592–1670), a Moravian, "has been called 'the father of modern pedagogy,' because of his early formulation of principles and methods which, two centuries later, were in harmony with the main current of pedagogical development. One of the contributions of Comenius which is of special interest to the student of industrial education is his exposition of the method of the arts. This is the result of an analysis of the methods then in vogue in the teaching of a handicraft, that is, through apprenticeship."[1]

John Locke (1632–1704) was an independent thinker, outstanding for his time. He published his "Essay on the Human Understanding," which has been regarded as the basis for modern empirical psychology. He became the chief exponent of the theory that education should fit a boy for practical life. His philosophy was based on the application of the methods of modern scientific investigation to a study of the mind. He is also important in the history of education in that he set forth the disciplinary conception of the educational process — "a sound mind in a sound body,"[2] being the fundamental basis for morality and learning.

With these brief words, even though many of the men and their influences on education have been omitted, perhaps we may see a partial background for Jean Jacques Rousseau (1712–1778) when he appeared on the educational scene.

Rousseau

Rousseau was born in Geneva, Switzerland, of French parents. His mother died when he was born and he was left in the custody of an aunt, who failed miserably in his early training. He was a wanderer by nature, and from his many travels, he learned much about how people lived, what they thought, and about natural and social conditions. His book, *The Social Contract,* is said to have been the cause of the French Revolution. His *Emile,* an imaginary boy, in which he described his education from birth to manhood, brought about an upheaval in educational thought of the day. It is of an extremely ironical type, which no doubt reflects the training and experience of Rousseau himself. He seemed to have a remorseful, temperamental, and defeatist attitude. His education was for the future man and not particularly for citizenship. It is significant that he omits the social side of life. He believed things to be unnatural in the hands of man, and he blamed both the French society and the schools for the unnatural conditions.

Rousseau would build on the interests, curiosities, and activities of the child — that education should be according to nature, with control or guidance. The teacher should be old in experience, not necessarily in years.

Adopting and adding to the Locke philosophy, Rousseau spread and popularized a new theory as to educational aims and procedure which dominated early nineteenth-century instruction in Europe.

Basedow

Johann Bernhard Basedow (1723–1790), the son of a Hamburg wigmaker, was strongly influenced by Rousseau's *Emile.*

He originated a plan for a school which would put many of the ideas of Rousseau into practice. He believed with Rousseau that, to obtain knowledge, the avenues of the senses and experience were to be used. But when the thing needed in his instruction was not available, he would resort to models and drawings. In this respect Basedow was following the thought of Comenius. He appealed for funds to enable him to open a school to try out his ideas. In 1774, Prince Leopold of Dessau, a town in northern Germany, became interested and gave Basedow the use of two buildings and a garden, and a sum of money with which to establish his new school.

The basic ideas of this experiment were: education according to nature, children treated as children — not as adults, language taught by conversational method, physical and manual training for both social and educational reasons. Instruction in real things — science, nature — was to take the place of instruction in words. Each child was to be taught a handicraft — turning, planing, and carpentering. Basedow was attempting to bring into the lives of a whole group of children what Rousseau had pictured as being given to but one child. It was therefore necessary for Basedow to bring the manual arts into the school and make it a part of the school curriculum.

The followers of Basedow urged acceptance of the new ideas of Rousseau as developed in the Basedow school, and helped to prepare northern Germany for the later, better-organized ideas of the German-Swiss reformer Pestalozzi, whose work will next be presented.

Pestalozzi

Johann Heinrich Pestalozzi (1746–1827), the son of a Zurich physician, may rightfully be called the "father of manual training." His career may be divided into three periods:

1. His experiment with industrial education at Neuhof in 1774
2. His period of literary activity for social and educational reform (1780–1798)

*Director of Guidance, Vocational and Adult Education, Jackson, Mich.

[1] Bennett, Charles A., *A History of Manual and Industrial Education Up to 1870* (Peoria, Ill.: The Manual Arts Press, 1926), p. 39.

[2] Cubberley, E. P., *A Brief History of Education* (New York: Houghton Mifflin Co., 1922), p. 231.

3. His period of reform in teaching elementary school subjects (1798–1827)

This study will treat only the first and third periods since the second does not deal directly with industrial education.

The psychology of Pestalozzi was of the *faculty* type, based on child study in elementary education. It led to better methods of teaching, better training of teachers, and a better understanding of the educational process.

Inspired by the writings of Rousseau on naturalism, Pestalozzi set up an industrial school on his farm in 1774, which place he called Neuhof. He thought that "a country life, in which the cultivation of the land was combined with some sort of handicraft would provide the best means of teaching the poorest children."[3]

He took in fifty beggar boys and girls and tried to teach them practical farm work and household work, in addition to spinning and weaving along with an elementary education in reading, writing, and ciphering. His philosophy was — the character will be good in proportion to the extent that environment is natural. The experiment at Neuhof was a great success until he increased the number of pupils to eighty, which was too many for his financial ability and so after two years, his school closed because of financial failure.

His next educational experiment was at Stanz in 1798. Many inhabitants of Stanz had been killed by the French troops during revolutionary days, and Pestalozzi was asked to establish a school for the orphan children. He followed the same methods as at Neuhof, but met with so many difficulties that he resorted to oral teaching. However, within six months French troops took over for military purposes the convent where the school was housed, and the experiment closed a dismal failure. It may be said that this six months marks a change from his interest in industrial education to the work of reforming through the ordinary subjects of the elementary school.

Pestalozzi's second education experiment of the third period of his life was at Burgdorf (1799–1804) where he was associated with five or six very good teachers. He maintained an institute for the training of teachers, received some government support, and voluntary subscriptions. The significance of this project was his working out the use of objects in the teaching of language, geography, arithmetic, and science. In 1801, he published "How Gertrude Teaches Her Children," which was a number of letters to a friend describing his educational principles. In 1805, he was compelled to discontinue his work at Burgdorf as the government needed the building for official purposes.

The last educational venture of Pestalozzi, of any consequence, was at Yverdun (1805–1825), which was an extension of the work begun at Burgdorf. It was very successful for the first five years, being visited by people from all over Europe. Textbooks were written and teachers trained to spread his methods. Due to dissension among his assistants and support being withdrawn, he had to close the Institute in 1825. He moved back to Neuhof and died in 1827.

Pestalozzi's aim of education was to bring about a reformed society through education for every child. His methods of teaching considered sense perception to be the foundation of knowledge and observation the basis for all instruction. He worked for an all-round development of the child through an activity type of curriculum.

Pestalozzi was really ahead of his time, because after the political revolutions of France, Switzerland, and America, a reaction set in, and before his ideas could be fully adopted, social, industrial, and political conditions had to change for people to become more interested in a fuller life.

Fellenberg

Of the many associates and followers of Pestalozzi, one of the most influential was Philip Emanuel von Fellenberg (1771–1844). He, having become convinced that correct early education was the best means whereby the State might be made a better place in which to live, decided to devote his life to the developing of his ideas. He was associated with Pestalozzi only a short time when he withdrew and established, on his own estate, a separate school at Hofwyl, which in 1829 comprised the following:

"1. A farm of about six hundred acres
"2. Workshops for manufacturing tools and clothing
"3. A printing and lithographing establishment
"4. A literary institution for the education of the well-to-do
"5. A lower or *real* school, which trained for handicrafts and middle-class occupations
"6. An agricultural school for the education of the poor as farm laborers and as teachers for rural schools."[4]

Fellenberg considered agriculture the best means of cultivating the social regeneration of man, but next to agriculture were the mechanic arts. This conception became the basic principle of all our agricultural and industrial education. His plan was not only widely accepted over Europe, but in the United States as well. The plan of combining farming and schooling, especially that of a mechanical nature, strongly appealed to Americans, and therefore many schools were established in different sections of this country.

However, the plan was destined for only a short existence in the United States, scarcely two decades, because of the rise of manufacturing and the opening up of the West where rich land could be obtained very cheaply.

Of the school at Hofwyl, Dr. Henry L. Barnard said, in 1854, "It attracted more attention, and exerted a wider influence than any one institution in Europe or America had up to the present time."[5]

Herbart and Froebel

Among the teachers who had been associated with Pestalozzi was Johann Friedrich Herbart (1776–1841), who later became one of the world's greatest educational philosophers. Herbart seems to have said very little about the manual arts, but it appears that he would give them a place among other school subjects as a means of discipline.

Friedrich Wilhelm Froebel (1783–1852) developed Pestalozzi's idea of organic growth into the doctrine of self-activity, as the core of education. Out of this concept grew the kindergarten and the handwork activities.

The difference between Herbart and Froebel was — Froebel would place handwork at the very center of his educational plan — he believed that man is born for action, and since activities precede thinking, education must logically begin with the doing. On the other hand, Herbart would use the hand activities merely as a means of teaching the accepted school subjects of the time. Herbart would use handwork as a method of teaching, while Froebel would use it as one of the subjects of the curriculum.

During the time of these more important educational developments in Europe, the idea of schools for teaching industrial work along with academic work was taking root in the United States, as has already been suggested. In 1745, a group of Moravians came to this country and established a colony at Bethlehem, Pa. Among other beliefs and forms which they followed, the older single men of the colony being artisans taught their chosen art or trade to the boys of 12 years and over.

In 1787, a type of work, mostly carpentry and gardening, was done at Cokesbury College, in Maryland. This may be said to be the forerunner of the Manual Labor Movement which really began in America forty years later.

In 1797, Dr. John de la Howe, a French Huguenot physician, who had settled in South Carolina, died and left a will, which provided an endowment of "an agricultural or farm school for educating, lodging, feeding, and uniformly clothing 12 poor boys and 12 poor girls whose parents or who themselves have resided in Abbeville County, not less than 6 years."[6] Since then the state has taken over the school which still stands, and is called the De la Howe State School. In point of age, it is probably the oldest agricultural school in the United States.

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[3]Bennett, Charles A., *A History of Manual and Industrial Education Up to 1870* (Peoria, Ill.: The Manual Arts Press, 1926), p. 111.

[4]Cubberley, E. P., *A Brief History of Education* (New York: Houghton Mifflin Co., 1922), p. 303.

[5]Bennett, Charles A., *A History of Manual and Industrial Education Up to 1870* (Peoria, Ill.: The Manual Arts Press, 1926), p. 128.

[6]*Ibid.*, p. 94.

Robert Owen, an Englishman, came to America in 1825, purchased 20,000 acres in Indiana and attempted to build a community more or less utopian in character, which he called New Harmony. This experiment put into operation in America many of the ideas of Pestalozzi and Fellenberg regarding manual labor in education.

As already stated, Fellenberg's school furnished the inspiration for the Manual Labor Movement in the United States, which lasted from about 1825 to 1843, having reached its height in 1834.

The need for better physical health and more money was greatest among students in theological seminaries, consequently these institutions championed the cause for this movement.

The most successful manual labor experiment up to 1829, it is said, "was the one at Andover, Mass., and this one became a model for others."[7] The manual labor at Andover was all industrial, but in others it was entirely agricultural.

However, the best example of the early schools to introduce the Fellenberg system of manual labor was the Maine Wesleyan Seminary (1825). Two others were opened at Gardiner, Me., and Derby, Conn. Probably the most famous was the Oneida Institute of Science and Industry at Whitesborough, N. Y. This school became so popular that many applicants were not admitted, since it could accommodate only sixty pupils.

The Oneida Institute influenced the establishment of the Manual Labor Academy of Pennsylvania at Germantown in 1829.

Many others were founded in the next few years, among which were (1) Theological seminaries at Auburn, N. Y., Maryville, Tenn., Danville, Ky., (2) Academies at Andover, Mass., South Hadley, Mass., Cincinnati, Ohio, (3) Colleges — Bowdoin in Maine, Waterville College, now Colby College in Maine, and Middlebury in Vermont.

Having found manual labor instruction to be impractical and unsatisfactory, one by one these educational institutions dropped the work, so that by 1842 or 1843, they had passed out of existence.

This article could very well be extended to include the establishment of the mechanic arts movements, and later the many manual training schools which developed in the United States, as a result of the Russian Exhibit at the Philadelphia Exposition in 1876. It might also go a step further and include the history of the breakdown of faculty psychology, with its accompanying effects on the process of learning and the introduction and development of industrial arts as we know them today. But this study has been confined to only the *early* attempts (about 1850) in manual and industrial education in this country. Obviously, not all attempts and experiments could be included within the confines of this article. Further, of course, not all of the early European experiments in manual and industrial education could be included. However, suffice it to say that it is hoped that this study clearly shows that some of the great European educational philosophies, theories, and practices had, and still are having, a decided influence in the field of industrial education in the United States.

[7] *Ibid.*, p. 183.

Building a General-Shop Curriculum

AMOS G. WILLIAMS*

To what extent should junior high school pupils be given shop experience? Of what should the basic experience consist? Should only boys be educated in the materials and common processes of industry? These are a few of the questions that must be considered when organizing a course of study for junior high pupils.

In harmony with the broad objectives of industrial arts, educators are well agreed that the initial courses of junior high level should be exploratory in content, and that they should deal with a variety of processes and materials. The general shop, conceived as a classroom or laboratory in which the floor space is divided into separate areas of activity, is a widely accepted development.

Junior High Objectives

In an early day, shop teachers prescribed a mass routine wherein specific exercises were required to develop manual skill in the hand operations of woodwork. The value of promoting manual skills was recognized, but many of the later objectives of industrial education remained in the background of theory.

A considerable carry-over from the practice of former years remains in many schools. Despite the changing social and educational aims of our time, traditional attitudes prevail. Subject matter is often assigned with slight regard for modern utility or pupil interest.

Are we concerned with mass production in the general shop? It is not the rate of production that determines whether an article is a "project," but rather the origin, purpose, approach, and the relationship of the pupil-teacher attitude. A leading educator has defined a project as: ". . . an intellectualized, wholehearted, and purposeful unit of work or activity proceeding to completion in a social enviroment or natural setting."

The tendency of shop teachers, as well as other instructors, has often been to emphasize the purely mechanical values of their work. High-sounding precepts have never been wanting in the school. But while the rising generations have been advised to love their neighbors, to bear one another's burdens, and to do good to those who spitefully use them, in practice there seems to have been something of the eye-and-tooth philosophy.

From the beginning of school shop programs until nearly recent times, the reasons advanced in support of the subjects have frequently been individualistic, selfish ones; reasons that were based indirectly upon the assumption that there is a competitive antagonism between a pupil and his associates. The main values attributed to early manual training consisted of such claims as: ". . . gives self-reliance . . . forms perseverance . . . prevents mischief, etc."

Modern educators appreciate the value of cooperative teamwork, where each pupil is an essential but inconspicuous part of organized activity. Society demands teamwork. When we eventually recognize that democracy and cooperative endeavor have a common significance, our teaching methods should properly reflect that attitude.

Administrative Organization

The industrial-arts department of the State Teachers College, Wayne, Neb., has designed a general-shop program to meet the needs of its junior-high and senior-high training school. A variety of exploratory units in the conventional processes and materials of industrial arts are offered to boys and girls in the seventh and eighth grades and to boys in the ninth, tenth, eleventh, and twelfth grades.

College students pursuing a minor or major course of study in industrial-arts education are assigned teaching under the direction of a departmental supervisor. The curriculum was necessarily planned to provide a maximum of general-shop experience for the pupils and to best accommodate the class schedules of the teaching candidates.

Classes meet daily for one period of fifty minutes, five days each week. The training school year is divided into two semesters of eighteen weeks, respectively.

*Associate Professor of Industrial Arts, State Teachers College, Wayne, Neb.

Each semester is divided into nine-week terms called "quarters." A quarter represents one fourth of the school year and is recognized as a convenient interval of supervised practice teaching. Seventh-grade boys and girls take general shop the first semester and eighth-grade boys and girls enroll the following semester. Ninth- and tenth-grade boys alternate with eleventh- and twelfth-grade boys in another class, every other year. General shop is not required of the senior-high pupils, but it is offered as an elective subject. These courses are all intended to promote the following educational aims:

Specific Objectives

a) To introduce the common materials of industry.
b) To acquaint pupils with the basic tools and processes of industry.
c) To provide pupils of all degrees of aptitude an opportunity to engage in wholesome, creative endeavor.
d) To develop in each pupil a certain degree of manipulative skill in the hand processes of industry.
e) To provide related information incident to the manufacturing and building industries.
f) To develop in each pupil an attitude of pride and joy in wholesome accomplishment.
g) To develop in each pupil safety consciousness and thoughtful procedure.
h) To provide a teaching situation of cooperative group activity.

Class Organization

The general shop is divided into five principal working areas, within which are contained the equipment for: (*a*) woodworking activities; (*b*) drawing and printing activities; (*c*) metalworking activities; (*d*) leathercraft and plastics handicraft activities; (*e*) finishing facilities. Training school classes are divided into two groups. In a given period, half the pupils are engaged in one area while the other group works in a different unit. It has been found that student teaching is less effective if the class is divided into too many groups.

Industrial-arts teachers know that the general shop presents a peculiarly difficult problem in so far as unified recitation, lectures, and demonstrations are concerned. It is desirable to correlate groups so that one is not, in effect, trying to teach separate classes. While lecturing or demonstrating to one group, the teacher may give an objective, written quiz to the other. In any case, one lectures under a handicap if another section of the class continues its shopwork. Simultaneous quizzes may be managed.

Instruction Sheets

Instruction sheets are helpful in the general shop. Project assignments, reference guides, and related information may be given conveniently in this manner. When organizing such material, one must do so with the knowledge that instruction sheets fulfill a comparatively limited application. It is said that instruction sheets may tend to encourage stilted teaching. This may be true if the instructor is a type of individual who will permit a single teaching device to replace further need of personal effort.

Management and Discipline

A student teacher has little difficulty creating interest. The curiosity of the students in the new surroundings leads them to assume a certain freedom of action that is not permitted in other classes. To prevent confusion, it is necessary to direct their energy from the start. On entering the room, pupils of the Wayne State Teachers Training School are taught to seat themselves at assigned stations, remaining quiet for roll call, for the issuing of materials, and for general announcements.

Class citizenship, courteous attitude, and reasonable discipline do not constitute regimentation. It is the unrestrained action and attitude of many children that has provoked criticism of the discipline prevailing in some schools. The general shop is a fair test of a teacher's ability to bring out the best in young folk.

Keeping Accounts

Issuing materials and supplies in a general shop is a greater problem than in a conventional unit shop. Planning and foresight save many needless steps. The supply cabinets, tool panels, and working areas should be arranged in a logical relationship. In general, there is waste and inefficiency whenever the stock room is open to pupils. Wood, metal, leather, plastics, finishes, etc., are kept in a stock room to which only the instructor has access. He alone issues supplies for class use.

The teacher's time should not be jeopardized by having to cut and issue project material during the class period. For those projects that are required in the course, the teacher should anticipate in advance and distribute supplies at the beginning of the period.

Bookkeeping can be annoying. Pupils' accounts may be simplified by using a "meal-ticket" system. A convenient form may be set up similar to the meal tickets used in cafés and restaurants. The cards may be printed or duplicated by mimeograph, as desired. The instructor punches out the value of each item when it is issued to the pupil. At the end of the school term, the cash value of the unused portion is returned to the purchaser.

Tool Checking

Each of the principal working areas have tool panels available to the class. Pupils are individually responsible for returning tools to their proper place. A brightly painted silhouette of each tool contrasts against a white-enameled background. A tool foreman is chosen from each group once a week. He is responsible for inspecting the panels of his area at the close of a period. This plan eliminates the need for a central toolroom or cage, but it might be less practical if classes are very large. The special tools are kept in cabinets and are checked out by the instructor. In two years of operation no tools have been lost through defection of a foreman.

Cleanup Maintenance

A five-minute period is allowed the class to place the shop in order, to store projects, and to tidy work stations before dismissal. While every individual is responsible for policing his desk, bench, or immediate work station, four pupils are chosen each week to police the floor and the waste containers. A regular rotation of personnel gives each person a chance to contribute his bit toward class citizenship. With moderate-sized classes this system has been successful.

Sequence of Junior-High Courses

Seventh Grade
(Course scheduled the first semester of each year)

First Quarter
Group I. Wood handicraft unit (9 weeks)
Group II. Leather handicraft unit (5 weeks)
Linoleum block-printing unit (4 weeks)

Second Quarter
Group I. Leather handicraft unit (5 weeks)
Linoleum block-printing unit (4 weeks)
Group II. Wood handicraft unit (9 weeks)

Eighth Grade
(Course scheduled the second semester of each year)

Third Quarter
Group I. Bench woodwork and woodcarving unit (9 weeks)
Group II. Tinwork unit (4 weeks)
Plastics handicraft unit (5 weeks)

Fourth Quarter
Group I. Tinwork unit (4 weeks)
Plastics handicraft unit (5 weeks)
Group II. Bench woodwork and woodcarving unit (9 weeks)

Sequence of High School Courses

Ninth and Tenth Grades
(Course scheduled each alternate year)

First Quarter
Group I. Bench woodwork and woodcarving unit (9 weeks)
Group II. Leather handicraft unit (4 weeks)
Plastics handicraft unit (5 weeks)

Second Quarter
Group I. Leather handicraft unit (4 weeks)
Plastics handicraft unit (5 weeks)

Group II. Bench woodwork and woodcarving unit (9 weeks)

Third Quarter

Group I. Blueprint reading, mechanical drawing unit (9 weeks)

Group II. Sheet-metal work unit (5 weeks)
Electricity unit (4 weeks)

Fourth Quarter

Group I. Sheet-metal work unit (5 weeks)
Electricity unit (4 weeks)

Group II. Blueprint reading, mechanical drawing unit (9 weeks)

Eleventh and Twelfth Grades
(Course scheduled each alternate year)

First Quarter

Group I. Leather handicraft unit (5 weeks)
Plastics handicraft unit (4 weeks)

Group II. Mechanical drawing unit (9 weeks)

Second Quarter

Group I. Mechanical drawing unit (9 weeks)

Group II. Leather handicraft unit (5 weeks)
Plastics handicraft unit (4 weeks)

Third Quarter

Group I. Bench woodwork and woodcarving unit (9 weeks)

Group II. Bench metalwork and art metalcraft unit (9 weeks)

Fourth Quarter

Group I. Bench metalwork and art metalcraft unit (9 weeks)

Group II. Bench woodwork and woodcarving unit (9 weeks)

Establishing Vocational School Admission Standards

BENJAMIN J. NOVAK*

Why Admission Standards Are Necessary

In the early days of vocational education, there were many misinformed educators laboring under misapprehensions concerning its function and purpose who did much to injure the reputation of the movement among employers and the general public. Only recently has a truer understanding of vocational education been developing, and the understanding is by no means complete.

Magill[1] aptly states: "The low esteem in which some employers hold the public school vocational training has proved in a number of cases to have been caused not so much by poor instruction as by a poor selection of pupils. Some employers have stated that they prefer graduates from the academic curriculum to graduates from the vocational curriculum because experience has shown them that the latter do not possess sufficient intelligence to make good employees. They say they can make up for the lack of training in the academic graduate, but not for the lack of intelligence in the vocational graduates."

For many years general educators have assumed that students who are academic failures should logically be placed in vocational courses. Many otherwise alert school people assume that vocational schools are institutions for backward, dull, maladjusted, and nonconforming pupils. Our vocational schools are not organized to teach simple vocational skills to the backward. Small beginnings have been made in an effort to meet the needs of such students, the number of which is appreciable. Some thought has been given to the planning of instruction in simple repetitive operations, such as assembly belt work. Such simple skills are usually so variable among different establishments, so specialized, and so readily learned on the job, that many thoughtful individuals wonder whether this type of learning can be acquired efficiently in schools.

Most of the vocational instruction, on the other hand, requires definite levels of intelligence and aptitude to permit mastery. It is unfair to the student of inferior aptitude to permit him to attempt the acquisition of a vocational skill which he has no possibility of mastering. Such a student, moreover, constitutes a definite menace, both to himself and his associates because of the hazards occasioned by the unintelligent use of tools and machines. It often is argued that it is undemocratic to deny anyone who desires admission to a public school offering. It would appear that a truer conception of democracy would be that which enables every individual to reach his maximum development and realize to the fullest extent his capacities in such a manner that he will be a social asset. A theoretically perfect counseling program would be one enabling each student so to realize his interests and aptitudes as to lead him to make a suitable choice of curriculum before he applies for admission to a vocational school or other institution of learning. An encouraging undertaking of this nature is being carried out in the ninth grade of a number of the Philadelphia junior high schools. In this program it is attempted to aid each student to analyze his interests and aptitudes. The students are given a battery of tests covering the areas of mental maturity, interests, social adjustment, achievement, and special aptitudes. The participating students make a profile indicating their comparative standing in each field. Conference periods are set aside during each week for discussion of the offerings of the senior high schools and vocational schools, and analysis of qualities necessary for success in various vocations. The exploratory year offered in some vocational schools serves a similar useful purpose.

There is yet to be overcome entirely the traditional American antipathy toward manual occupations, which are considered to be of inferior social acceptance as contrasted with the so-called *white-collar* vocations. An inferior vocational school product does not aid the breaking down of this prejudice.

More than one educator has pointed out that the greater cost of vocational courses over corresponding general courses makes the attempt to train unqualified students in vocational programs an exceptionally unpardonable waste of public funds. The 1942 cost,[2] for example, per pupil based on average daily attendance in Philadelphia, was $168.17 for senior high schools, and $215.25 for vocational schools. It is perhaps superfluous to add that waste of human resources or any public fund, however large or small, is entirely without defense.

In many areas there is often an excess of applicants over the facilities available in the vocational school program. In such cases the operation of a set of admission

*Murrell Dobbins Vocational School, Philadelphia, Pa.

[1] Magill, Walter H., "Selection of Pupils for Vocational Courses." American School Board Journal, 103: 19–20, November, 1941, p. 19.

[2] *The Bulletin 1944 Almanac and Yearbook*, published by the Evening Bulletin, Philadelphia, p. 400.

[3] Smith-Hughes Act of Congress, Senate Bill 703, Sec. 11 (1917).

standards permits a selection from among the candidates on an impartial, relatively objective basis.

Types of Standards Which May Be Utilized

The Smith-Hughes[3] and subsequent federal acts subsidizing vocational education have been interpreted as applying to "normal" students. Generally speaking, a student having an intelligence quotient under 90 is considered to lack the intelligence to master readily the theoretical aspects and classroom work involved in most of the trades offered in vocational schools. Often, however, limitations in abstract intelligence seem to be partially offset by unusually strong interest and exceptionally well-developed special aptitudes.

It may probably be stated with accuracy that at the present time a majority of vocational programs are now employing some type of standards in the selection of their students. In some instances vocational directors have occasionally been overzealous in their mental ability requirements. It is unwise to forget that various occupations vary greatly in the abstract intelligence required for their mastery. In fact, even within a given vocation there is likely to be a relatively wide distribution of intelligences demanded by the performance of various specific jobs. It is possible to select students who are too bright as well as those who are too dull. Vocational offerings should be examined carefully with the view of developing admission requirements having some relation to the standards of employment. To cite an example — a student in a foundry course, generally speaking, need not make as high an intelligence score as an individual who is to learn drafting. It might be claimed, on the other hand, that a very bright foundry student may become an owner or foreman, but the likelihood is greater that dissatisfaction and maladjustment would be the result.

The Smith-Hughes Acts sets 14 years of age as the minimum for entry into specialized industrial training. Many vocational districts superimpose the requirement of ninth-grade completion or higher. A number of educators argue that the majority of young people lack the necessary emotional maturity, physical development, co-ordination, and seriousness of purpose to justify entry into specific vocational training before attaining the age of 16 or 17. Some take an even more extreme view and urge high school graduation as a prerequisite. It is pointed out further that in a peacetime economy, minimum age requirements for employment make it impractical to graduate students at too early an age. Fleming,[4] in his Pittsburgh study, found some statistical evidence that students entering the vocational school at 16 and 17 years of age seemed to be superior in their shop achievement to younger students. Somewhat the same inference was drawn from a similar study made at the Dobbins Vocational School.[5] It should be noted, however, that there is by no means general agreement on this point. In a recent publication Beach[6] quotes a study by Mitrano which showed that 14-year-old students tended to score higher on aptitude tests than did students of more mature years. On this basis he takes exception to those who recommend minimum age requirements other than those determined by employability. Beach may be overlooking that achievement in industrial instruction is not a simple correlate of aptitude test results alone. In any event, the problem is in need of further research.

The physical requirements for occupation vary. Cardiac cases, for example as a general rule, are to be discouraged from work involving severe physical exertion. A medical examination, therefore, is an important prerequisite for admission into vocational courses.

Important factors in the possible success of students in manual vocations are their emotional make-up, interests, mechanical aptitude, manual dexterity, structural visualization, and other specific aptitudes. There are many otherwise capable individuals, for example, who lack the finger dexterity and general co-ordination to master certain manual skills. Variations in temperament may cause an extroverted type of individual to be unsuccessful in adapting himself to a vocation in which he is compelled to work in comparatively quiet surroundings with inanimate materials. Trained psychologists in school systems, universities, and in personnel offices associated with industrial establishments, have used form boards, tweezer dexterity tests, and many other devices to good advantage with individuals. Private testing bureaus have been helpful in assisting those individuals able and willing to pay for the service, to arrive at a better estimate of their potentialities. It must be noted, however, that some private agencies have proved to be fraudulent and vicious in this connection.

The average vocational school, unfortunately, is unable to afford the detailed examination of each applicant by a trained psychologist. It must resort to pencil and paper group tests, tryout experiences, and simple interviewing techniques for the acquisition of such information. These tests are generally immeasurably inferior to the individual performance tests, but properly interpreted, are useful. Within recent years a group of interest tests have been developed, among which might be mentioned: (1) Strong's Vocational Interest Blanks, (2) Kuder's Preference Record, (3) Cleeton's Vocational Interest Inventory. The most commonly used mechanical aptitude tests have been shown to be of low validity, some even appearing to measure traits other than mechanical aptitude. The two tests in this field generally used are Stenquist Mechanical Aptitude Tests and the Revised Minnesota Paper Form Board Test. These are of some service, providing that the results are not used without corroboration from other sources. The Detroit, Mac Quarrie, and O'Rourke tests in this field have declined in importance. The Washburne S-A Inventory has been found to be helpful in gaining some insight into personality. The field of written personality tests is relatively undeveloped.

An examination of the previous school records of students seeking admission to vocational schools is fruitful in supplying information on their possible success. It may generally be assumed that individuals are consistent, and people who are successful in their work and attendance at one school are likely to continue the pattern elsewhere. Research has revealed that elementary school records have some validity in predicting high school success, and that secondary school records are significant in predicting college success. Research on this matter in the vocational education field has been limited. Fleming[7] found that correlations between success in subjects in previous schools with success in vocational school were low, but positive and reliable. It is perhaps superfluous to note that much marking by teachers has been shown to vary in reliability and significance. Although further research is indicated, the perusal of previous records is a valuable practice in considering students for admission to vocational courses. There have been cases where students have had inferior scholastic histories, but attained a high degree of success in vocational school. This does not invalidate, however, the significance of the previous academic record.

Much very useful and valuable information concerning the interests, background, health, and personality of the applicants can be obtained from a brief interview by shop teachers of the vocational school.[8] The teacher obviously is generally less skilled and has less time at his disposal than an experienced interviewer, but the information thereby obtained is none the less helpful. Printed forms, to be filled out by the applicants, may serve as a guide to the procedure.

Many regular vocational courses are generally three years in length, beginning with grade ten. It is the practice in some vocational schools to admit students at the beginning of grade nine, offering a year of exploratory or tryout instruction. Students are permitted five or more different shop experiences. When the student indicates a definite vocational preference he may be placed in a trade of his choice, or in cases where his interests and aptitudes are of a different nature, receive counsel-

[4]Fleming, Joseph W., "Predicting Trade School Success," *Pittsburgh Schools*, Vol. XI, May-June, 1937, No. 5, pp. 169–178.

[5]Novak, Benjamin J., "How Effective Is the Selection of Students for Vocational Schools?" *Education*, May, 1941, p. 535.

[6]Beach, C. Kenneth, "Selection of Pupils in Vocational–Industrial Schools," Industrial Arts and Vocational Education, *November*, 1943, p. 360.

[7]Fleming, Joseph W., *op. cit.*, pp. 187–196.

[8]Novak, Benjamin J., "Interviewing the Prospective Student," Industrial Arts and Vocational Education, September, 1943, pp. 284–286.

ing enabling him to find a suitable course of instruction in a high school or elsewhere. This tryout procedure is difficult, but when properly carried out is of great worth.

Conclusion

Tests and other devices most likely will grow in validity and reliability as prognostic instruments. It should not be overlooked, however, that many unforseen circumstances may prevent the fruition of aptitudes even though the potentialities may clearly be recognized in advance. At best, it can only be said that any individual, given a certain set of circumstances, is either more or less likely to succeed in a given vocational course.

The administrator in a practical situation will utilize as many of the criteria just outlined for admitting students as is feasible, and he will continually revise his procedures as altered circumstances and the results of research appear.

Inspection Training Course

G. HAROLD BILLINGHAM*

While it is not practical in most school systems to organize an inspection course despite the demand for qualified workers, a few lessons can be devoted to the subject. Inspectors with shop knowledge, and machinists with inspection experience are of special value in their own field.

The following condensed material has been compiled from actual plant and inspector training experiences.

Definition: An inspector is one whose duty it is to secure by supervision the proper performance of work of any kind, or to ascertain by examination the condition or quality of the work or of any article offered for sale or transfer.

Duties of an Inspector

Supervise: (when authorized)
Examine: Quality (visual defects)
Check: Accuracy, quantity
Read blueprints: (Means of duplication)

These sheets frequently replace blueprints. They give direction for production and inspection.

First sheet indicates the number of sheets required for the job.

1. Designates department where work is to be done.
2. Specifies machines, tools, fixtures, etc.
3. Specifies inspections, and gauges with sizes.

"What to do, and how to do it"

Know dimensions of particular assignments.

Know decimals, fractions.

Check route card:

Travels with the work, indicates progress.

Designates the operation number and order of operation.

Has column for inspection stamps, both setup and final.

Date finished and quantity.

Takes care of variation of quantity from previous operation, and reason for same.

NOTE: For protection, the check route card is enclosed in a cellophane envelope.

Be able to use precision instruments:

NOTE: Accurate measuring devices are really not absolutely accurate, nor perfect. Be able to take proper care of them. Be able to handle them.

Personal Appearance

Headdress:

Adequate protection.

Hair covering: nets, dust caps, turbans, kerchiefs, etc.

Avoid inflammable hair gadgets: combs, hairpins, barettes, novelties, hair ribbons, bows or loose ends.

Wear safety helmets and goggles if necessary.

Clothing:

Appropriate — sensible. No dangling ornaments, jewelry, etc. Be dressed neat and clean.

Sleeves:

Short fitted sleeves are desirable. Long close fitted sleeves should fit tightly at the wrist. Sleeve protectors may also be worn if necessary.

No string ties:
No loose belts, strings, or bows:
Trousers or slacks:

Cuffs are not desirable on trousers or slacks. Check length. They should be fitted at ankle.

Keep shirt tails in!
Footwear:

Sensible, comfortable, protective, sensible heels, *no cutouts*, not "run over," soles adequate thickness, laces short and tied. Safety shoes if necessary.

Desirable traits:

Be thorough	Use tact
Be dependable	Use common sense
Be punctual	Avoid unsafe acts
Be cooperative	Avoid unnecessary interference
Be impartial	Command respect
Be self-confident	Practice good housekeeping
Be responsible	Wipe before measuring
Be pleasant	Wipe working surface
Be tactful	Wipe equipment
Be alert	Wipe work
Be courteous	

NOTE: Come prepared with right attire, equipment, knowledge.

Always alert — never hurt.

Personal Equipment

Scale:

Metal rule.

Pencil:

Mechanical pencil, or pencil and a small pencil sharpener.

Pad:

Small notebook or small cards 3 by 5 in.

Magnifying Glass: Desirable, but not absolutely necessary — 0 to 1 in., 1 to 2 in.

Handle micrometers carefully.

Check them frequently; oil them sparingly according to the manufacturers' directions. *Avoid loaning* them to others and have them marked for identification.

NOTE: *Do not keep mike closed tight* when not in use. Do not turn the thimble on 2 in., or larger mikes up beyond 0 in. The 0 to 1 in. is called a 1-in. mike. The 1 to 2 in. is called a 2-in. mike, etc.

Cloth or waste:

Supplied by plant.

Hand cream:

"Pro-tek," "Patriot's Lotion," "Toushey," or similar hand creams or lotions.

Soap:

"Lava" or similar hand soaps.

Inspection Organization

Chief inspector:

Executive head of inspection department.

Foremen inspectors:

In charge of departments.

Supervise the actual operations performed within these departments.

This includes work of traveling, field; or operation inspectors, and bench or crib (cage) inspectors.

Also check all gauges used by inspectors in the department.

Traveling, field, or operation inspector:

Watch new setup of machines.

Check first few pieces produced.

Bench, crib (cage) inspectors:

Inspect parts after each operation or series of operations.

Inspection crib, cage, or rooms:

Space usually screened or partitioned off from the rest of the department.

Ordnance inspection:

Inspectors placed by U. S. government.

*High School, Weehawken, N. J.

General Inspection Methods

There are three general systems:

Random, complete, combination.

Random or percentage inspection:

Is based upon the principle of inspecting a certain definite number of parts, then judging the quality of the entire output on the results obtained.

Complete inspection:

Is 100 per cent inspection requiring each part to be inspected after each operation.

Combination inspection:

Combines the random and the 100 per cent inspection. They check the first piece for accuracy of setup. Errors are corrected immediately on the machine. Traveling inspector checks for quality. A certain number of the parts are then taken to the crib for 100 per cent inspection.

Warning:

Inspection may be carried to extremes, prove uneconomical, and be a hindrance to manufacturing.

NOTE: An inspection system should be organized and conducted to cooperate with management for rapid production.

Inspection Gauges or (Gage)

(Gauge or gage are both correct spellings. Probably *gage* is now used more than the older *gauge*.)

Four sets: Master, checking, working, tolerance.

Master gauges: Used only to check gauges (measuring blocks, for example).

Checking gauges: Opposite of master gauges. That is, if the master gauge is a plug gauge, the checking gauge is a *caliper* type ring gauge.

Working gauges: Used by traveling inspectors, bench inspectors, and machine operators.

NOTE: Used on the job. Tolerance slightly smaller than those specified for the work in order to give the machine operators a small margin of safety.

Tolerance gauges: They are used on final inspection by bench inspectors. Made with specified tolerances.

Testing inspection gauges: Should be tested at regular intervals for wear and adjustment.

NOTE: A general average for gauge wear is .0001 in. for each 1000 gauging applications.

Warning: Snap gauges or other measuring tools should never be used to measure revolving or moving work. Check work *only* when not in motion.

Reinspection of Rejected Work

Parts which have been rejected during the operational inspections are often reinspected with tolerance or final inspection gauges. Those accepted pass on to assembly. Those rejected are salvaged or scrapped.

NOTE: The salvaging process is an expensive one, because the parts are individually handled. Not a production process.

Special Forms of Inspection

Partial assembly:

Parts placed in special forms, or jigs, to check proper operation.

Selective assembly:

Parts especially picked out for mating purposes where an allowance is necessary for meshing, fits, lubrication, etc.

Profile or contour inspection:

Work of irregular outline is inspected with profile or contour gauges called *templates* (patterns). Where profile extends nearly or completely around the work *go* and *no go* (not go) gauges are used. Work should drop through one (*go*), and not the other (*no go*).

Visual inspection:

For the finish:

Made on surfaces which have been cleaned, polished, burred, ground, lapped, scraped, plated, sprayed, lacquered, anodized, etc.

For defects:

Burrs, poorly finished surfaces, rough threads (th'ds) scars from errors in tool setting (setup), etc.

For hardening, tempering, case hardening, etc.

For color, shade, tone, etc. (standard test).

Teaching Materials for Industrial Education

CHRIS H. GRONEMAN*

The following list of teaching aids was collated to help the teachers of the various departments of industrial arts and vocational education.

Many of the booklets and articles contained in this list have cost those who distribute them quite an appreciable amount of money. It is but courtesy to enclose sufficient postage with your request to cover mailing charges.

It is advisable that teachers use school stationery when writing for any of the items listed. All items are free unless otherwise noted. In most cases a small charge is made when free items are ordered in quantities.

Drawing

A. B. Dick Co., 720 West Jackson Blvd., Chicago 6, Ill.

How to Plan and Publish a Stencil Duplicated Paper

How to Use the Mimeograph Duplicator

Producing the School Yearbook

She Also Serves

Simple Methods

Suggestions for the School Paper

The History and Operation of Stencil Duplication

Eugene Dietzgen Co., 318 Camp St., New Orleans, La.

Use and Care of Drawing Instruments

Lettering Chart

Drafting Materials With Tables in back pages

School Catalog

How to Use a Slide Rule (booklet)

Ditto, Inc., Harrison at Oakley Blvd., Chicago, Ill.

Hints on School Newspapers

Ditto Writing and Drawing Materials

How to Construct and Use Objective Tests

More Leisure Time With Ditto

Folder of Ditto Workbooks and Supplies

Folder of Ditto School Machines

Ditto Supplies for Schools

A Service to Ditto Users

Eagle Pencil Co., 703 East 13th St., New York City

Turquoise Prismacolor Pencils (chart)

Aviation Drafting Series (for mechanical drawing instructors only)

Decimal Equivalent Chart (for mechanical drawing instructors only)

Eberhard Faber Pencil Co., 37 Greenpoint Ave., Brooklyn 22, N. Y.

Basic Standards in Mechanical Drafting (wall chart No. 1)

Basic Standards in Architectural Drawing (wall chart No. 2)

Basic Principles in Sheet Metal Development (wall chart No. 3)

Standard Symbols in Electronic and Radio Engineering (wall chart No. 4)

Standard Woodworking Joints (wall chart No. 5)

(These charts available to instructors only free of charge)

Color in Camouflage Portfolio (8 color plates and accompanying text) (free to teachers; available to students and others at 50 cents per copy)

How an Eberhard Faber Lead Pencil Is Made (Circular)

Esterbrook Pen Co., Camden, N. J.

Three Lesson Plans on Lettering

*Industrial Education Department, A. & M. College of Texas, College Station, Tex.

The Manufacture of Pens Exhibit
Lesson Plan on the Use and Care of the Fountain Pen
(Above items available to teachers at no cost)

Higgins Ink Co., 271 Ninth St., Brooklyn, N. Y.
Techniques — 50 cents
Script and Manuscript — 50 cents
Cartooning — $1
Arts and Crafts Projects — $1
Ink Sketching
Higgins Memorial Awards Folder
Biography of Chas. M. Higgins
Higgins Color Card
History of Ink
Catalog Sheet and Leaflets

Koh-I-Noor Pencil Co., Inc., Bloomsbury, N. J.
Set of Sketch Reproductions
Koh-I-Noor Sketching Aids (circular)

Louis Melind Co., 362 W. Chicago Ave., Chicago 10, Ill.
For Teachers of Art (wall charts)
For Mechanical Drawing Instructors (chart)

Related Arts Service, 511 Fifth Ave., New York City
Art in the Service of Schools at War — 3c

Revere Copper and Brass, Inc., 230 Park Ave., New York City
Tomorrow's Homes for the Many
Researching for a New Standard of Living
A House With No Kitchen
New Homes for Better Living
Better Homes for Lower Incomes
Higher Living Standard at Lower Cost
Apartment Homes for Tomorrow's Better Living
Homes for Tomorrow's Happy Living
Homes to Enrich Our National Standard of Living
After Total War Can Come Total Living
A House With a Future
Home for a Nation on Wings
Your Children Could Romp Here While You Shop
Preview of a New Way of Life
A Flexible House for Happier Living
A Leisure Center
Why City Planning Is Your Responsibility
A Hillside Built This House
Airplane Helps Build This House
A Children's Center or Nursery School
Livable Homes for Those Who Love Living
Making Better Health Available to All
A Monument the Living Can Use
Paul Revere Historical Prints (4-color)

Victoray Corp., Battle Creek, Mich.
Victorny Literature on Blueprint Machines and on Photocopy Machines
Blueprint — Direct Black on White Prints
Photocopy Prints

Electrical and Communications

Allied Radio Corp., 833 W. Jackson Blvd., Chicago, Ill.
Radio Builder's Handbook (No. 37–750), 10c
A Dictionary of Radio Terms (No. 27–351), 10c
Radio Formula and Data Book (No. 37–352), 10c
Radio Circuit Handbook (No. 37–353), 10c
Radio Data Handbook (No. 37–354), 25c
Manual of Simplified Radio Servicing (No. 37–355), 10c
Coil Winding Calculator (No. 37–955), 25c

American Telephone and Telegraph Co., 195 Broadway, New York City 7, N. Y.
The Birth and Babyhood of the Telephone
The Telephone's Message
The Telephone in America
The Magic of Communication
Victory Calling
(Available on request at Bell Telephone business offices, or direct from American Telephone and Telegraph Co., New York City)

The Arrow-Hart & Hegeman Electric Co., 103 Hawthorn St., Hartford 6, Conn.
Electrical Control for Heating and Ventilating Systems
Motor Controls
Wiring Devices

Eisler Engineering Co., 740–770 South 13th St., Newark 3, N. J.
Electronic Equipment Catalog 38–CE–43–B
General Glass Working Equipment 38–CE–43–B
Glass Slicing and Cutting Machine Catalog — Bulletin No. 11–43
Lamp and Glass Working Machinery Catalog 38–CE
Spot Welders CE–44–W and Bulletin No. 93–W–43
High Vacuum Pumps — 38–CE
Wire Cutting and Shaping Machines 38–CE
Laboratory Electronics Equipment for Schools, Colleges, and Experimental Research 38–CE
Blow Torches, Crossfires, and Burners of All Kinds 43–B

The Electric Storage Battery Co., Allegheny Ave., and 19th St., Philadelphia 32, Pa.
Large lecture wall chart (Ad Form 1089)
Small wall chart (Ad Form 1628)
The Storage Battery — Its Fundamentals, Use and Maintenance (Form 4250)

General Electric Co., 1 River Road, Schenectady, N. Y.
Electricity in the Chemical Industry GEA–3710
How Electronic Tubes Work GEA–4116
The Story of Steinmetz GEB–104B
The Story of Lightning GEB–124
The Story of G-E Research GEB–113
What's New in the World of Science, Vol. II GEB–127[1]
The Story of the Turbine GEB–129
The Romance of Electricity GEB–131
They're Turbosupercharged GEB–132
The General Electric "House of Magic" GED–872
A Primer of Electronics GED–1068
Motion Picture Catalog GES–402J
The Invisible World . . . and other stories GES–2962
The News Digest GES–3125.7[2]
Things I've Been Thinking About GES–3222
Television GES–2405

Meissner Mfg. Co., Mt. Carmel, Ill.
Meissner "How to Build" Instruction Manual — 50c
Meissner Precision Built Products

National Carbon Co., Inc., 30 East 42nd St., New York 17, N. Y.
The Inside Story of Dry Batteries
Automotive Cooling System Standard Practice Instructions — Chart
Cooling System
The Automobile Cooling System — Chart
Eveready Manual of Cooling System Service

Ohmite Mfg. Co., 4835 W. Flournoy St., Chicago, Ill.
Cut-Away View of Typical Ohmite Rheostat (chart)
Cut-Away View of Ohmite Resistor (chart)
Ohm's Law Chart
Parallel Resistor Chart
Ohmite Ohm's Law Calculator — 10c

RCA Victor Division, Radio Corporation of America, Camden, N. J.
The Magic Brain of All Electronic Equipment Is a Tube
RCA Victor-Audio-Visual Service for Schools
Planning Tomorrow's Schools
Opening New Frontiers of Knowledge
Radio Age — monthly publication of RCA
Electrons in Action at RCA
RCA What It Is — What It Does
Electronics in Industry
Tube Handbook — All Types HB–3 (subscription basis)
Receiving Tube Manual RC–14 — 25c
Phototubes Bulletin (single copy free)
Radiotron Designer's Handbook — $1
RCA Guide for Transmitting Tubes — 35c
Power and Special Tubes Bulletin TT–100
Receiving Tubes and Allied Special-Purpose Types — Bulletin 1275–B
Tube Picture Book — 10c

Radio Receptor Co., Inc., 251 W. 19th St., New York 11, N. Y.
Airport Control With UHF
Highways of the Air

Tennessee Valley Authority, Knoxville, Tenn.
Tennessee Valley Authority — 1933–37
Soil — The Nation's Basic Heritage
TVA and the War
The Widening of Economic Opportunity through TVA
TVA Program — 10c
Unified Development of the Tennessee River System (1936) — 25c
Barite in the Tennessee Valley Region — 50c
Clay Resources of the TVA Region — Part I — 50c
Engineering Geology and Mineral Resources of the Tennessee Valley Region — 50c
Iron, Chromite, and Nickel Resources of the Tennessee Valley Region — 50c
Structural Materials of the TVA Region — 50c
Tripoli Deposits of Western Tennessee and Mississippi — 50c
Manganese Resources of the Tennessee Valley Region — 50c
Manuals for Soil Erosion Control in the Tennessee Valley (Engineering Phase) — 85c
Manual for Soil Erosion Control in the Tennessee Valley (Reforestation Phase) — 80c
Pumps and Plumbing for the Farmstead — 50c
Rural Electrification Lessons for Boys' Groups — 25c
Rural Electrification for the Home — 50c
Studies in the Heating of Small Houses — 50c
Wiring and Lighting the Farmstead — 40c
Safety Manual — Rural and Urban Distribution System — 50c
Electric Poultry Equipment for the Farm — 50c
Tennessee Valley Architecture
TVA Employee Relationship Policy
County Government and Administration in the Tennessee Valley States
Recreation Development of the Tennessee River System
Tennessee Valley Authority Act
General Agreement between TVA and Tennessee Valley Trades and Labor Council
The Cost of Distributing Power
Nitrogen for Industry

[1] Contains reprints of Photo News Service, a poster published every two weeks during the school year. Teachers may be listed to receive it periodically.
[2] Issued every two months. Teachers may be listed to receive it periodically.

TVA Now
Facts About TVA Dams
Sketch Map of the Tennessee Valley

Universal Scientific Co., Inc., Vincennes, Ind.
The Crow Rotating Electric Machine
Universal Scientific Demonstration Equipment for Electrical Instruction Experimentally
Equipment and Literature for a Complete Course in Electricity
Manual of Instructions for Choke and Resonance Coil
Learning Electricity Experimentally by C. S. Siskind — $2
A Guidance Test and Manual of Demonstrations in Physics and General Science by F. W. Lancaster — $1.50
Interesting Experiments in Magnetism and Electricity and Electro-Magnetism by C. S. Siskind — 75c

Westinghouse Electric & Mfg. Co., 306 Fourth Ave., Pittsburgh 30, Pa.
The Stuff Our World Is Made Of
Eyes for the Little Worlds
Strange Peoples of the Little Worlds
Amber and Amperes
Today's Ben Franklins
Science in Everyday Things
The Biggest and Littlest Things in the Universe (chart) — $1
The Electromagnetic Spectrum (Chart) — $2
Everyday Electricity Charts: *The Electric Iron; The Electric Percolator; The Electric Refrigerator; The Electric Elevator; The Fluorescent Lamp; The Incandescent Lamp; The Electric Toaster; The Electric Motor; and The Vacuum Cleaner*
Man's Heritage of the Skies
Heritage of the Soil
Science in Everyday Things
Pictorial Bulletins
Catalog of Teachers' Aids Available from Westinghouse School Service

Willard Storage Battery Co., 246 E. 131st St., Cleveland, Ohio
The Starting and Lighting Battery
AABM Battery Service Manual
The Nerve Center of Ten Million Cars
Willard General Catalog Technical Supplement
(Single copies of this material are available at no charge; additional copies — 10c each.)

Wiremold Co., Hartford 10, Conn.
Wiremold File Bulletins
Wiremold Catalog and Wiring Guide
A Course in the Elements of Modern Surface Raceway Wiring

(To be continued)

Selected Articles on Industrial Arts and Vocational Education

WM. H. JOHNSON* and ISADORE M. FENN**

A selected bibliography on industrial arts and vocational education indicating briefly the nature of the contents of the article and presenting its brief summary in a fashion that is inviting.

INDUSTRIAL ARTS AND VOCATIONAL EDUCATION MAGAZINE

May, 1936

INTEREST AND LEARNING, Gilbert L. Betts and Roy R. Van Duzee, pages 135, 136.
A study which negates the commonly accepted idea that lack of interest reduces learning.

INDUSTRIAL EDUATION AND INDUSTRIAL MUSEUMS, John Woodman Higgins, pages 137–141.
An endorsement of American independent public trade school system of industrial education in preference to outgrown apprenticeship-training systems for skilled craftsmanship. A recognition of the cultural reaction of manual skill.

GENERAL METAL-SHOP ORGANIZATION, G. A. Wickman, pages 141–143.
A description of a general metal shop in which machine work, benchwork, forging, welding, and foundry work are taught.

September, 1936

THE HOME-WORKSHOP ORGANIZATION, Ross C. Cramlet and William L. Hunter, pages 259–264.
Practical hints for the shop teacher who wants to organize the home-workshop enthusiasts of his community.

DRAFTING-ROOM PRACTICE, Heber A. Sotzin, pages 267–271.
A helpful summary of the American standard drawing and drafting-room practices which were approved by the American Standards Association in May, 1935.

CLASS PERSONNEL ORGANIZATION, Stanley S. Radford, pages 275–277.
A practical article on how to institute a shop personnel organization in the school shop.

October, 1936

THE CHALLENGE OF INDUSTRIAL ARTS, F. Theodore Struck, pages 295–296.
An excellent statement of the place industrial arts should occupy in the field of education, in the life of the nation, and in the mind of the industrial-arts teacher.

ORGANIZING EVENING CLASSES, Reginald A. Ivy, pages 297–301.
A few timely suggestions for the shop teacher of evening-school classes.

November, 1936

PROVIDING FOR INDIVIDUAL DIFFERENCES, F. R. Kepler, pages 303, 331.
Suggestions for helping the student evaluate and adjust himself in the mechanical drawing class.

SELECTION OF A VOCATION, R. T. Craigo and William Hood, pages 334, 335.
A guide for boys in deciding what trade, occupation, or profession to follow.

December, 1936

VOCATIONAL EDUCATION, Edward A. Fitzpatrick, pages 370–371.
A concept of vocational education which must become more general if this type of education really is to fulfill its mission.

March, 1937

THE INDUSTRIAL-ARTS LABORATORY, Louis V. Newkirk, Colman Hewitt, R. T. Hunter, pages 69–72.
An excellent picture of a new laboratory course in the Chicago school system.

REORGANIZING A HIGH-SCHOOL SHOP, Paul R. Pierce and Ted R. Hunter, pages 78–80.
A fine description of how the school shop may be converted into a laboratory of industry which will best fit the needs of its students.

ORGANIZATION OF RELATED SUBJECTS, Arthur A. Dick, pages 83–85.
A method of analyzing and co-ordinating related work with shopwork in the industrial-arts department.

INDIVIDUAL INSTRUCTION SHEETS, Burton T. Williams, pages 86–87.
An evaluation of some of the standard objections raised against the individual instruction sheet.

April, 1937

FROM CONCEPTS TO TECHNIQUES, Verne C. Fryklund, pages 111–114.
An excellent article showing how both the industrial-arts teacher and the vocational teacher must of necessity work toward the same goal — the education of the individual.

SOCIAL SECURITY AND INDUSTRIAL EDUCATION, John F. Friese, pages 114–116.
A thoughtful discussion on the opportunities with which teachers of industrial arts and vocational education are confronted at this time.

THE CHALLENGE OF CHANGED CONDITIONS, Archie P. Nevins, pages 119, 120.
An article dealing with industrial arts as a vital part of general education in this machine age.

May, 1937

GRADUATE WORK ON THE DOCTORAL LEVEL, R. W. Burgett, pages 143, 144.

*Superintendent of Schools, Chicago, Ill.
**Chicago Vocational School, Chicago, Ill.

An article of considerable interest to that ever-increasing number of industrial-arts and vocational-education instructors who are working for higher degrees.

PRESENT TRENDS IN VOCATIONAL EDUCATION, James Hoskins, pages 147, 148.
An account of how California is adapting vocational education to present needs.

June, 1937

THE SCIENTIFIC METHOD AND HISTORICAL RESEARCH — I, L. F. Ashley, pages 173–175.
The first of a series of four articles on industrial-arts research.

EDUCATIONAL TESTS AND MEASUREMENTS, George J. Mann, pages 175–177.
An article including a good bibliography for those interested in tests and measurements.

WHAT THE SHOP INSTRUCTOR NEEDS TO KNOW, R. T. Craigo, pages 177, 178.
Factors which must be considered by those engaged in the training of instructors for trade and industrial classes.

August, 1937

RESEARCH POSSIBILITIES IN THE LABORATORY ORGANIZATION — III, L. F. Ashley, pages 235, 236.
An excellent article on industrial-arts research.

MALADJUSTMENT AND LEARNING IN RELATION TO INTEREST, Gilbert L. Betts, pages 237, 238.
A study of the value of interest in learning.

October, 1937

CHRONOLOGICAL DEVELOPMENT OF THE INDUSTRIAL-ARTS CONCEPT, L. F. Ashley, pages 309–312.
A very hepful study tracing the use of some words used to designate the shop-work in our schools.

A PHILOSOPHY OF INDUSTRIAL-ARTS EDUCATION, William L. Hunter, pages 313–316.
A discussion of what should be accomplished in and by the school shop.

EVOLUTION OF MECHANICAL DRAWING, Harvey W. Waffle, pages 329–334.
A brief historical sketch of the origin and development of mechanical drawing and its relationship to modern engineering.

March, 1938

INDUSTRIAL-ARTS LABORATORY PLANNING —I, William L. Hunter, pages 101–104.
An article treating lighting.

THIS THING CALLED "METHOD" — I, Lawrence F. Ashley, pages 105–108.
An able discussion of the evolution of the project.

ORGANIZING AND LEARNING IN INDUSTRIAL-ARTS EDUCATION, Verne C. Fryklund, pages 112–113.
Systematically organized industrial-arts courses, rather than those developel haphazardly, will facilitate real creative learning and achievement.

May, 1938

EDUCATION FOR THE 85 PER CENT, J. W. Studebaker, pages 179–182.
A broad educational view of the value of industrial arts and vocational education.

TEACHING METHODS WHICH INCREASE INDUSTRIAL-ARTS ACHIEVEMENTS, Robert E. Smith, pages 185–188.
An explanation of methods which make industrial-arts work function more efficiently in the life of the student.

June, 1938

OCCUPATIONAL TRAINING AND EMPLOYMENT, Heber A. Sotzin, pages 219–224.
A consideration of the need for educational service, its type, and also the need for governmental economy.

September, 1938

PROGRESSIVE INDUSTRIAL ARTS, D. M. Schweickhard, pages 265–268.
A thoughtful article which portrays in an interesting manner the influence exerted by the industrial arts on other educational fields.

NEW EMPHASIS IN AMERICAN EDUCATION, Deyo B. Fox, pages 280–282.
A guide for vocational education in assuming its share in modernizing the education needed by present-day and future Americans.

October, 1938

PREDICTING TRADE-SCHOOL SUCCESS — I, Joseph W. Fleming, pages 315–318.
The first part of a study submitted to the University of Pittsburgh in partial fulfillment of the requirement of the degree of doctor of education.

SPECIFIC SUGGESTIONS FOR TEACHING INDUSTRIAL STUDENTS, John T. Shuman, pages 322–323.
Fourteen points which will assist the instructor of industrial arts and vocational education in making his work vital and effective.

AN INDUSTRIAL-ARTS CONSUMER UNIT William J. Micheels, pages 324–325.
An example of a unit that stresses the consumer values inherent in industrial-arts work.

November, 1938

PREDICTING TRADE SCHOOL SUCCESS — II, Joseph W. Fleming, pages 365–367.
The second part of the author's study which embraces the relation of the entering grade and of intelligence to persistence in attendance.

THE PUBLIC MUST BE TOLD, J. E. Grinnell, pages 371–373.
A way to publicize the industrial-arts offerings of a school system.

DISTINCTIVE ELEMENTS OF THE INDUSTRIAL-ARTS PROGRAM, James McKinney, pages 380–381.
The value of industrial arts to a boy as compared with the value of other subjects to him.

January, 1939

TWENTY-FIVE YEARS OF APPRENTICESHIP IN AMERICA, Wm. F. Patterson, pages 10–12.
A historical résumé of what has been done in the training of our skilled workers during this century. (1913 to 1938)

TWENTY-FIVE YEARS' PROGRESS IN VOCATIONAL EDUCATION, L. H. Dennis, page 13.
A summary of the development of vocational education in U. S. since the beginning of this magazine.

February, 1939

AIMS AND TYPES OF INDUSTRIAL EDUCATION, Homer J. Smith, pages 45–47.
A paper read at Atlantic City, March 1, 1938.

JUVENILE DELINQUENCY AND VOCATIONAL EDUCATION, Wm. H. Dooley, pages 52–54.
An appeal to educators to expand their efforts in preparing youth for right living.

March, 1939

BUDGETING SCHOOL-SHOP DEPARTMENTS, Earl L. Bedell, pages 87–90.
Factors that must be considered if school-shop budgeting is to be done.

CHICAGO INDUSTRIAL-ARTS LABORATORY PLAN, Louis V. Newkirk, pages 100–106.
A detailed exposition of this new development.

HOME MECHANICS IN THE CHICAGO PUBLIC SCHOOLS, Wm. H. Johnson, pages 118–122.
A clear presentation of the type of shop-work Chicago is now offering the seventh and eighth grade pupils in its public schools.

TRAINING SAFE WORKERS FOR INDUSTRY, Wm. H. Cameron, page 38A.
An important message to the industrial-arts and vocational-education instructor.

April, 1939

TRENDS IN INDUSTRIAL-ARTS EDUCATION, Frank C. Moore, pages 137–140.
A forecast and suggestions for the improvement of industrial arts in elementary and secondary education.

EFFECTIVENESS OF EDUCATION MOTION PICTURES, Arnold W. Reitze, page 152.
The results of a study submitted in partial fulfillment of the requirements for the degree of doctor of philosophy.

May, 1939

INDUSTRIAL-ARTS INTEGRATION, Harvey E. Parry, pages 195–199.
A broad view of the word "integration" as it applies to the education of the entire person.

RADIO PROGRAMS OF INDUSTRIAL ARTS, Clifford K. Lush, pages 199–200.
Two fifteen-minute programs.

September, 1939

COURSE OF STUDY CONSTRUCTION IN INDUSTRIAL EDUCATION, Verne C. Fryklund and Earl L. Bedell, pages 261–263.
An understanding of fundamental principles which are applicable in any school system.

LEARNING AND LABOR, Dean M. Schweickhard, pages 263, 264.
Excellent material for the shop teacher to embody in his general talks to his students.

TEACHING MATERIALS FOR INDUSTRIAL EDUCATION, Chris. H. Groneman, pages 272–278.
A list of free or inexpensive teaching aids.

VOCATIONAL OPPORTUNITIES IN AVIATION, John Rogers, pages 281, 282.

A list of occupations found open to interested workers in the field of aviation.

November, 1939

THE HOPE OF A NATION, Dean M. Schweickhard, page 362.
A development of the thought that the proper preparation of its youth, not the amassing of wealth and power, ought to be the first concern of every nation.

December, 1939

CREATING COMMUNITY INTEREST FOR VOCATIOAL COURSES, Waldo L. Adams, pages 392–394.
A method of getting the community and the school to cooperate in giving youth a real start in life.

DOES GUIDANCE CONCERN TEACHER EDUCATION?, Lawrence F. Ashley, pages 396–399.
An exceedingly thoughtful discussion and pronouncement on this important subject.

September, 1940

MACHINES AND MEN, Dean M. Schweickhard, page 269.
A relationship between machines and men.

WHAT ABOUT THIS THING CALLED GUIDANCE, J. I. Sowers, pages 274, 275.
A discussion of doing the work of guidance correctly.

October, 1940

CO-ORDINATING LOCAL NATIONAL DEFENSE PROGRAMS IN VOCATIONAL EDUCATION, John T. Shuman, pages 305, 306.
A recognition of an emergency in training which faces the school.

INDUSTRIALISM AND ADULT EDUCATION, Burl Neff Osburn, pages 310, 311.
Thoughts on an industrial democracy.

December, 1940

WHAT IS INFORMATION IN TRADE AND JOB ANALYSIS, Verne C. Fryklund, pages 400–402.
Instruction in technical information.

FIVE HUNDRED YEARS OF PRINTING, Merritt W. Haynes, pages 403–405.
Development of printing and printing's service to a democracy.

TERMINAL ENGINEERING COURSES FOR TRADE SCHOOLS, Drew W. Castle, pages 412–414.
A discussion of training for men contemplating engineering as a career.

January, 1941

A CHALLENGE TO INDUSTRIAL-ARTS EDUCATION, Raymond B. McHenry, pages 4, 5.
A description of the progressive education or new curriculum movement in secondary education.

INTEGRATION THROUGH CO-ORDINATION, Earl M. Bowler, pages 9, 10.
A bridging of the gap between the traditional school and the vocational school.

March, 1941

LABORATORY OF ARTS AND INDUSTRIES, Wm. H. Johnson, pages 83–84.
An explanation of an advanced shop and drawing course especially designed to meet the educational needs of boys in the upper grades of the general high school who do not wish to follow a straight technical or vocational course.

AN ARTS AND INDUSTRIES LABORATORY, H. D. Thomas, pages 94–96.
A study of a laboratory designed to meet the local needs of Cambridge, Ohio.

TRAINING FOR NATIONAL DEFENSE, Robert W. Tarbell, pages 105–106.
An explanation of the National Defense Program of training workers for industry.

INDUSTRIAL ARTS IN THE DEFENSE PROGRAM, Fred C. Finsterbach, pages 107, 108.
A thoughtful discussion of the relationship between the industrial arts and the National Defense Program.

CURRICULUM REVISION FOR DEFENSE, Don R. McMahill, pages 121, 122.
Outlines of courses readily adaptable to any national defense emergency.

GRAPHIC AIDS IN CONTINUOUS OCCUPATIONAL ANALYSIS, Clyde A. Bowman, pages 122–126.
Unique procedures used in occupational analysis. (This article to be continued in the next issue.)

A PROPOSED VOCATIONAL GUIDANCE PROGRAM, W. J. Dunning, pages 136–138.
A program of vocational guidance which does not include any tryout or exploratory courses.

PERSONNEL SERVICE IN INDUSTRIAL ARTS, Isadore M. Fenn, pages 138–140.
An advancement of the theory of giving the student information in the field of his particular qualifications and interests before the time of his choice of specific training for an occupation.

QUALIFICATIONS OF AN INDUSTRIAL-ARTS TEACHER, Eugene Giammatteo, pages 23A, 26A, 32A.
Advice to the teacher of industrial arts concerning extensive preparation for his work.

April, 1941

CONTRIBUTION OF INDUSTRIAL ARTS TO A FUNCTIONAL EDUCATION, Earl L. Bedell, pages 141–143.
Fundamental concepts concerning the industrial arts in the scheme of American education.

THE SCHOOL THAT BOYS BUILT, Walter E. Durbahn, pages 143–148.
A story of the erection of a building, the making of equipment, diversified experience in the use of tools and materials and a greater appreciation for the skills required in industrial production.

THE MIDGET WIGGLY BLOCK TEST FOR MECHANICAL ABILITY, Howard O. Reed, pages 153, 154.
A test to measure the mechanical ability of high school boys.

May, 1941

CONTRIBUTIONS OF INDUSTRIAL ARTS TO INDUSTRY AND TO NATIONAL DEFENSE, F. Theodore Struck, pages 179–181.
A thoughtful discourse on the valuable background and initial training provided by industrial-arts education which contributes effectively to present-day needs of modern industry and to national security.

CO-ORDINATING NATIONAL DEFENSE TRAINING, Earl M. Bowler, pages 183–184.
A challenge to co-ordinators to attain specific objectives established by schools cooperating in the National Defense Training Program.

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PLANNING AND EQUIPPING A GRAPHIC-ARTS SHOP, Roy R. Van Duzee and Raymond W. Sturm, pages 219–225.
A discussion of the problems encountered in the planning, selection, purchase, and use of equipment for a graphic-arts shop.

LEARNING BY DOING, Raymond D. Meade, pages 228–230.
An interesting description of the construction of a new vocational agriculture annex by a student body.

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IMPLICATIONS FOR INDUSTRIAL EDUCATION OF THE A.V.A. STUDY OF VOCATIONAL GRADUATES, Arthur B. Mays, pages 263–264.
A study by the Research Committee of the American Vocational Association of the outcomes of vocational education as it is now provided by the public schools.

SAFETY IN SCHOOL SHOPS, Roy R. Van Duzee, pages 267–270.
A safety program to prevent accidents. (This article is continued in the Nov. 1941 issue.)

RELATION OF INDUSTRIAL ARTS TO VOCATIONAL EDUCATION, Walter E. Durbahn, pages 270–271.
An understanding of industrial training program offered in our modern school curriculum: industrial arts, general industrial, technical, and vocational or specific trade training.

VISUAL AIDS IN VOCATIONAL EDUCATION, Francis J. Coyte, pages 273–279.
A list of visual-aid materials offered as a possible source of help to the shop and to related and academic teachers in the vocational schools.

WAYS THAT WIN, Dean M. Schweickhard, pages 314, 316.
An exposition on the desire to succeed at the things one attempts, and what it really means to succeed.

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INDUSTRIAL ARTS IN A SYSTEM OF PUBLIC EDUCATION, Heber A. Sotzin, pages 365–368.
A discussion of the possibilities of industrial arts as a contributory element in realizing the aims of general education.

THE RELATIONSHIP BETWEEN INDUSTRIAL ARTS AND VOCATIONAL EDUCATION, T. A. Hippaka, pages 368–369.
An explanation that there is a definite relationship between industrial arts and trade education, and that one in no way undermines the importance of the other.

COUNSELING PROCEDURES OF INDUSTRIAL-ARTS TEACHERS, Louis V. Newkirk, pages 369–370.
Ways in which industrial-arts teachers should help in the guidance of boys who are considering a technical or trade career.

EXAMPLES OF GOOD HOUSEKEEPING, F.

Theodore Struck, pages 371–373–378.
Rules for good shop management and housekeeping.

OUTLINE OF SAFE DRIVING COURSE, C. R. Lindstrom, pages 378–381.
An outline of a college course called, "Rules of the Road," to eliminate auto mistakes, offered by The State Teachers College at Peru, Nebr.

THE GIRLS BEHIND THE MEN BEHIND THE GUNS, Edward W. Stluka, pages 381–383.
An article on the preparation of women, particularly young women between the ages of 17 and 25, for defense work.

SAFETY IN THE SCHOOL SHOPS, Roy R. Van Duzee, pages 384–385.
A safety program to prevent accidents. Continued from Sept., 1941 issue.

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BOSTON AND THE AMERICAN VOCATIONAL ASSOCIATION CONVENTION, Edward C. Emerson, pages 411–414.
An interesting description of schools in Boston.

TECHNICAL AND TRADE EDUCATION, Homer J. Smith, pages 414–418.
An explanation of the two phases of industrial education which sets forth the theory that they are indispensable parts of one undertaking — one introduces, represents and explains industrial life; the other trains for, up-grades in, and adjusts to life.

SANTA BARBARA'S NEW INDUSTRIAL DIVISION, Emanuel E. Ericson, pages 419–421.
Aspects of the new industrial-division plant of the Santa Barbara State College in California.

ADJUSTMENT THROUGH THE ARTS, C. H. Waller, pages 424–426.
Discussion of personal and social needs, interest questionnaire for industrial arts, and an analysis sheet.

ELECTRIC-SHOP PUPIL — PERSONNEL ORGANIZATION, Carl F. Oberschmidt, pages 427–430.
A very helpful article on electric-shop organization.

THE EIGHT BIG 8's IN INDUSTRIAL EDUCATION, R. T. Craigo, pages 431–432.
Various descriptions of schools, shops, jobs, and tools; and what common factors, elements, or units apply to all shops, trades, schools, and jobs.

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INTERRELATIONSHIPS OF INDUSTRIAL ARTS AND VOCATIONAL EDUCATION, Lawrence F. Ashley, pages 1–4.
Logical discussion of relationship.

OBJECTIVES OF INDUSTRIAL EDUCATION, A. F. Dodge, pages 5–7.
An advancement of the idea that schools should offer occupational training to all.

SPATIAL PERCEPTION TEST FOR DETERMINING DRAFTING APTITUDE, John Edmund Crawford, pages 10–12.
Research on prediction of mechanical drafting aptitude.

METHODS OF TESTING IN MECHANICAL DRAWING, Stanley S. Radford, pages 12. 13.
Ways of finding the results of teaching effort.

A PERFORMANCE TEST INVOLVING ACCURACY, FINISH, AND TIME, Robert S. Hunter, pages 13, 14.
A measure of pupil efficiency in all three elements.

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EVALUATION OF INDUSTRIAL-ARTS TEXTBOOKS, Raymond J. Coltharp, pages 44–48.
A selection of suitable textbooks and reference material.

SAFETY IN THE SCHOOL SHOPS, Roy R. Van Duzee, pages 50–52.
A continuance from page 385, November 1941 issue.

ORDERLY PROCEDURE IN THE SCHOOL PRINTSHOP, J. Orville Wood, page 53.
Methods for keeping the shop intact and running smoothly.

THE "COURTING" PERIOD IN VOCATIONAL GUIDANCE, Hyman Goldstein, pages 56, 57.
Many ways in which the industrial-arts teacher can practice vocational guidance.

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THE PHILADELPHIA PROGRAM OF VOCATIONAL EDUCATION FOR DEFENSE, Charles F. Bauder, pages 83–87.
A system of training workers preparing for or employed in industries essential to national defense.

VOCATIONAL EDUCATION IN DETROIT MOBILIZED FOR NATIONAL DEFENSE, Earl L. Bedell, Walter E. Gleason, Herman G. Schumacher, pages 88–90.
An account of one city's training of workers for defense production industries.

CIVILIAN DEFENSE AND THE SCHOOLS, Robert W. Tarbell, pages 91–93.
The presentation of a problem of civilian defense — a job for the schools.

CONNECTICUT STATE TRADE SCHOOLS TRAIN WOMEN FOR INDUSTRY, T. E. Keyes, pages 95–97.
An exposition on the training of women machine operators and inspectors for the National Defense Training Program.

COURSE OUTLINE FOR TRAINING AIRCRAFT-ENGINE ASSEMBLERS AND TESTERS, Ray F. Kuns, pages 97–101.
Plan of training and assembly and test procedure.

COURSE OF STUDY IN RADIO COMMUNICATIONS, Frank Petraglia, pages 106–109.
Instruction in the international radiotelegraph code, sending and receiving, on the exploratory level.

COURSE OF STUDY IN SHEET-METAL WORK, Herbert K. Iverson, pages 109–113.
Subject aims, methods, and analysis of sheet-metal operations, occupations chart, tests, tools and equipment, supplementary projects, and related information.

OUTLINE OF INSTRUCTION FOR INDUSTRIAL-ARTS METALWORK, Gerald L. Waltrip, pages 116–118.
A compilation designed to serve as an indirect source of information for the student as an organized method of instruction for the teacher.

DEVELOPMENT, USE, AND EVALUATION OF AN ARTS WORKSHOP, Fred J. Schmidt, Jr., pages 119–126.
An account of the Burris-Arts Workshop which was established through the combined efforts of faculty members of the art, English, household arts, industrial arts, and music departments of the Burris Laboratory School and Ball State Teachers College, Muncie, Indiana.

THE PUPIL-PERSONNEL SHOP ORGANIZATION, G. H. Silvius, pages 24A, 27A, 28A, 30A, 32A.
A discussion on the advisability of the use of student help to facilitate the operation of a school shop or laboratory.

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IN-SERVICE INSTRUCTOR TRAINING FOR WAR PRODUCTION, John R. Patlow, pages 141–147.
A plan for teaching to train inexperienced workmen and to coach those who need additional training.

SOME ASPECTS OF INDUSTRIAL-ARTS TEACHER PREPARATION, Stanley J. Pawelek, pages 147–149.
An abstract of an unpublished doctoral dissertation entitled, "An Analysis and Evaluation of Certain Common Functional Training Characteristics of Teacher Preparation in Industrial Arts."

THE VALUE OF AN EXPERIMENTAL ATTITUDE, Noel B. Grinstead, pages 149–151.
An essay which develops the idea that to experiment is to grow and to stop growing is to become professionally inert.

STATE SUPERVISION OF INDUSTRIAL-ARTS EDUCATION, William J. Micheels, pages 154–157.
A continuance from page 138 of the March, 1942 issue.

THE MILWAUKEE EXPERIMENT, John J. Metz, pages 160–161.
A program whereby an industrial firm or several such firms furnish materials to the school for the manufacture of essential parts to be used in producing necessary war equipment, munitions, or power machinery to bring World War II to a victorious conclusion.

LEVELS OF LIVING, Dean M. Schweickhard, page 162.
A charge that the level at which an individual or family lives is too frequently measured by false or inappropriate standards.

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VOCATIONAL AND AVOCATIONAL INTERESTS FOUND AMONG INDUSTRIAL-ARTS STUDENTS IN GRADES VI AND VII, Lester V. Hill, pages 185–190.
A study of the boys in the 6th and 7th grades of the Dunbar, George Mason, and Buchanan schools of Richmond, Virginia.

IN-SERVICE INSTRUCTOR TRAINING FOR WAR PRODUCTION, John R. Patlow, pages 193–197.
A continuance from page 147 of the April, 1942 issue.

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VITALIZING ELEMENTARY AND SECONDARY EDUCATION THROUGH THE PRACTICAL ARTS, William F. Rasche, pages 233–235.
A description of a new, better suited, more applied, and more vital curriculum — designed to serve more adequately the youth of the community.

DEVELOPING GOOD WORK HABITS AND ATTITUDES, Albert E. Jochen, pages 243–245.
A basis for developing a suitable appraisal sheet for evaluating student work habits and attitudes.

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PRESELECTION AND CLASSIFICATION OF DEFENSE TRAINEES, Laurence W. Ross, pages 273–277.
A treatise on selecting the most employable and trainable candidates for enrollment in defense classes and assigning those selected to the classes for which they appear most suitable.

RECORD FORMS FOR WAR PRODUCTION TRAINING CLASSES, J. Henry Schroeder, pages 280–282.
Forms developed at Southern Illinois Normal University for use with the vocational education program for training war production workers.

AERONAUTICS COURSE FOR A TECHNICAL HIGH SCHOOL, Frank E. Bohata, page 290.
A course of study for an aeronautic construction shop which will be found very helpful.

A TRIBUTE TO A GREAT LEADER, William T. Bawden, pages 291, 292, 320, 18A.
The life of Charles Alpheus Bennett, a pioneer in the field of education.

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THE DEMONSTRATION, Ray Karnes, pages 323–326.
A study of the demonstration method of teaching basic technical subjects in the Armored Force School and a check list for demonstration.

FOREMAN TRAINING, E. H. Rueter, pages 326–327.
A unit on foreman training which explains the advantages of a well-trained and competent group of foremen.

JOSEF SANDBERG — PIONEER, Vincent P. Conners, pages 328, 330.
The career of Josef Sandberg, who in 1890, came to Boston from Sweden to assist Mr. Gustav Larsson in establishing the first Sloyd School in America.

POINTERS FOR THE NEW TEACHER, Albert E. Jochen, page 330.
Helpful suggestions.

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A PROGRAM FOR CONSERVING SHOP TOOLS AND EQUIPMENT, Philip L. McNamee, pages 365–368.
A very helpful conservation program.

STEPS IN TEACHING A LESSON, Roy E. Howard, pages 369–370.
Steps to go through and the procedure to follow in daily teaching in the Armored Force School.

VOCATIONAL EDUCATION AND WAR-PRODUCTION TRAINING, Walter J. Brooking, pages 371–374.
A recognition of the need for vocational training for workmen released from ordinary jobs to work in some phase of wartime production.

GRAPHIC-ARTS OCCUPATIONS, R. Randolph Karch, pages 384–387.
A discussion of peacetime and wartime importance of graphic arts, career opportunities, health conditions, etc.

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PLANNING THE DAILY LESSON, William J. Micheels, pages 414–417.
Plans from the Teacher Training Department of the Armored Force School, Fort Knox, Ky.

GRAPHIC-ARTS OCCUPATIONS, R. Randolph Karch, pages 424–429.
Continuance from page 387 of the November, 1942, issue.

ARTS AND CRAFTS IN MODERN LIVING, Harold H. Kirk, pages 430–431.
An explanation of the school's duty to create situations which will project craft habits and desires beyond the shop.

(To be continued)

What Every New Worker Should Know About Safety

JOHN B. DUNNE*

When things go well we usually don't bother about placing blame and indulging in recrimination. But when the going gets rough — as it has in the accident prevention field — we start thinking in terms of finding a place to deposit the guilt. I do not wish to do that, as I am of the opinion that we can best attack accidents through the cooperation of all interested parties. I have heard men in the safety field lambaste the trade and vocational schools for the young "whippersnappers" they are turning out with no consciousness of safety rules or practices. I don't believe these complaints are wholly justified. True enough, some schools have had to produce a great quantity of students, and some of these may have been lacking in common safety sense. The many vocational schools I have visited, however, have been only too anxious to turn out potentially safe workers if industry would *just tell them what they want along this line.* — So it all comes back to working it out together.

I am reminded at this point of the good "Scotsman" who had imbibed a little too freely of the national beverage. He was walking along a country lane with his loving wife, Annie, who was belaboring him somewhat for his overindulgence. When they came to a steep hill where a span of mules was laboring to haul a heavy wagon up the grade, Annie spoke: "Would you look there, Sandy mon, at those wonderful beasts — how they pull? Isn't it shameful that we can na go through life pullin' together like them?" Sandy looked at the team and then said ruefully, "Aye, Annie, but wee'l ye not note they have but one tongue between them?"

Maybe that is what we need — one tongue between us so that we can pull together a bit better for safer workers in industry.

Every new worker should know that the skill of doing his job includes doing it safely. Now this idea isn't original! I learned it from a vocational teacher a few years back when I was visiting Brooklyn Technical High School in New York for the purpose of making a sound slide film on vocational school safety. What he told me was briefly this: "I don't try to teach safety as a separate subject to my boys. I don't think safety is a thing which can be superimposed on their other training. When I am teaching a boy to run a machine, I tell him from the start that the machine can't think for him, but *it can bite.* I try to teach him that there is one way to operate that machine skillfully, and *that is safely.*"

Would that there were more shop teachers like this. He was giving his boys a real respect for safety, which is of tremendous importance to both the worker and the plant to which he goes for employment.

Students in the vocational schools should be given responsibilities on the safety committee. In this way they will learn the problems which confront a shop safety committee when they enter a plant. It may seem, in the hurry and rush of training potential workers, that there is little time for what some teachers have termed "frills." Safety training is one of the *essentials* of vocational schooling and *not a "frill."* Working on a committee to prevent accidents while still in school will sharpen the wits of these potential workers,

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*Auxiliary Defense Corps, General Electric Company.

INDUSTRIAL ARTS AND VOCATIONAL EDUCATION

John J. Metz, Editor

Rehabilitation A Paying Educational Investment

The Barden-LaFollette Act, passed in 1943, which changed former rehabilitation acts by authorizing the Federal Government to bear the state administrative costs, shows its good effects in a number of different ways.

According to a report by Michael Shortley, the director of vocational rehabilitation, there has been a decided upswing in vocational rehabilitation since federal money is taking care of a larger part of the cost of this type of training. Over the 23-year period from 1920–43 an average of nine thousand individuals were annually rehabilitated under the old program. Since the passage of the Barden-LaFollette Act, the number of rehabilitants who have been placed in employment has risen to 42,000 in 1943.

Not only has the rehabilitation of these unfortunates had a good psychological effect upon the individual, but persons affected have increased their annual earnings from approximately five million dollars to the stupendous amount of sixty-five million dollars.

At the same time the cost of rehabilitating a person dropped from $392 per person in 1938 to $239 in 1942, and it is expected that the cost can be cut to $159 in 1945.

This new law which changed the former rehabilitation acts quite drastically authorizes the granting of hospitalization, surgical and medical care, and occupational therapy for those who can be made employable again. It is designed for civilians only since war veterans are eligible for rehabilitation under an act quite distinct and separate from the one here mentioned.

The School Shop and War Surplus Materials

The adoption of a suitable policy for the disposal of surplus war goods is receiving a great deal of attention in governmental circles and in the daily newspapers of late. This material has been purchased with money that was received by the government either as taxes or in the form of war bonds. At any rate, the public has paid for the material, and in most cases, has paid very well for it.

Among this surplus material are many power machines of a size that would be suited for school shops. There also are vast quantities of materials, such as wood; metals in bar, rod, and sheet form; small tools, such as drills, augers, reamers; hand tools of various kinds; and supplies of a great variety.

It would seem justified, then, if the school system of the country were given an opportunity to choose what they need from this vast supply house, and that they would get the material free except for the cost of transporting it to the place where it is needed.

In this way, at least a part of the huge amounts of money spent originally for purposes of destruction would be returned to accomplish needed peacetime purposes. Then, too, school shops have done a good job in training warworkers. In many cases the school shops were working the clock around. This constant use did not improve the power machines owned by the school; hence, this would be an opportunity for many schools to re-equip without asking too much assistance from the local taxpayer.

Of course, some sort of priority procedure should be worked out so that the smaller and more needy school systems would get the first chance at this surplus war material. In supplying the needs of the schools of our country in this way, there would not be such a large concentration of free school equipment that it would materially affect the purchases which schools ordinarily make from industry; hence, it would do little or no harm to labor, industry, and business.

Under no conditions should this material be turned over to brokers so that the schools would have to purchase it through a dealer, thus forcing the taxpayer to buy the same material twice and to pay two profits.

This war surplus material is now available. Let us make the best possible use of it for the schools so it will cause least harm to business and to postwar employment.

A Forward Step

A forward step in the democratization of education has been taken by the state of Missouri. In the rewriting of the state constitution, permission is given to hold white-Negro schools in local districts which request them.

St. Louis University has set a precedent by admitting five Negro students to the summer session just completed, and more than three fourths of the 360 students of the University of Missouri that were polled favored the admission of Negroes as regular or graduate students in professional schools.

This is a step in the right direction. America, which prides itself on the fact that it is the melting pot of nations, owes it to itself to treat all peoples and races justly and humanely. The Negro race did not come to America of its own free will. Having been brought here under duress as slaves, it is time that the descendants of the slaves who were freed by Abraham Lincoln be treated fairly and given the same opportunities and rights accorded to other Americans.

Educational Guidance for Returning Soldiers

The War Manpower Commission is performing a real service through the distribution of a booklet calling attention to the impending need for many vocational counselors and setting forth the qualifications which such counselors will need.

The task demands an adequate staff of counselors to guide the millions of young men coming out of the armed services to seek their first civilian employment or to prepare themselves to take up a new civilian career.

The boys who went into the army and navy will come back as full adults in every way. The able bodied will be active and ambitious and impatient for the most part. The wounded and ill may have handicaps which will limit their choice of vocation. But most of the veterans will be limited only by the knowledge and advice available to them.

Vocational counseling for these veterans is no incidental task to be assigned to amateurs. Here there is need for experienced men and women who understand human nature, know all about the arts and sciences, the intricacies of business, and the demands of industry. The corps of counselors who will stand ready for the returning veterans must be recruited and trained, and that will take time.

Shop teachers interested in the guidance phase of their field should start at once to prepare for this work.

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and when they are absorbed in industry, they will consider activities of the safety committee as essential to the well-being of each worker.

Vocational schools should introduce students to personal safety equipment. It should not be necessary when a new worker is hired to have to *sell* him on wearing safety shoes or to *convince* him of the need for eye protection. Or in the case of a girl it should not be necessary to *entice* her to wear protection for her hair. New workers should come to their job *expecting to wear the personal safety equipment designed to make that job as safe as possible!*

It is most discouraging to go into a plant and see a number of young workers with their safety glasses on their foreheads or on the bench; or wearing sports shoes, moccasins, or sandals. It is equally discouraging to see them working with their respirators hung around their necks when they should be worn over their faces.

New workers should know that much time, thought, and engineering has gone into the perfection of these pieces of safety equipment, and when used properly, they will prevent accidents and insure the health of the employee. I suppose I am trying to emphasize the necessity for the vocational schools to help create the proper attitudes about safety. After all, when we come right down to it, safety on the job is a personal matter. If we can influence the potential worker so that he or she *wants to comply* with the rules, we have mastered the problem of personal safety equipment to a great extent. But if a group of new workers comes in with the attitude that they are going to *get by* with as much as they can, plant safety records are going to present a pretty sorry picture.

So, if young men and women coming into the plants are already convinced of the tremendous value of these aids to safety, the schools will be rendering a fine service to the accident prevention field.

The new worker should know about the danger of infection. I don't need to dwell on the tremendous volume of man hours lost due to neglected small injuries. The little cut or abrasion, or the prick of a piece of metal may seem trivial, but these are the sources of countless lost hours of production. Remember, the serious accident, like an amputation, fracture, or severe burn, receives the finest medical care as quickly as possible. It's the little neglected cut or the one wrapped in a dirty handkerchief which causes most infections.

I was asked to visit a large technical school in Chicago a few years ago, and while in the office of the medical director, a lad came in limping noticeably. The doctor looked at the boy's pallid, unhealthy complexion and had him sit down in the examining chair at once. An examination of the leg showed a small wound, red, swollen, and angry, and from it emanated two or three easily discernible red streaks. Here were the telltale danger signals of septicemia or blood poisoning. Now here was a lad in a technical school who had not been taught the dangers of neglected injuries. His time in the hospital would be charged against the safety record of a plant if he were employed, and if he was fortunate enough to keep the limb, it would have been more luck than management.

So let's tell the students in our schools about the pitfalls of neglected wounds. Acquaint them with the source of first aid. Better yet, teach them first aid so that they can learn about the care of injuries and the need for proper medical attention. Then when these young folks come to an industry, they will seek first aid for their injuries as a matter of course, and cut the score of our arch enemy, infection.

The new worker should know that he can't "beat the guard." How many, many accidents occur because someone thought he could do it faster and better without using the guard provided on the machine. Here we have the same problem as with personal safety equipment. If, in their schooling, these new workers learn a healthy respect for all devices on machines put there to safeguard them, they are going to carry this respect to their new jobs. And they are not going to try to find every reason under the sun for operating without it. New workers should know that trying to "beat the guard" is a losing game. So if the vocational schools can help develop in their students the right attitude toward such safeguards, they will be aiding the safety program of industry immensely.

Industry is constantly interested in improving its products. It is also interested in the well-being of all of its employees. I am firmly convinced that the vocational or trade schools are interested in their products, too. They want to turn out alert, efficient, skillful workers to fill up the ranks of industry. It seems only logical that industrial plants and vocational schools should cooperate to the fullest extent to insure a steady flow of responsible safety conscious young workers into the vital jobs which will bring ultimate victory for our country.

Training for Citizenship in the Industrial-Arts Department

HAROLD F. DAVIDSEN*

When the present international conflict is over, the American schools will be faced with a greater responsibility than ever before. The industrial-arts departments will have to assume a greater part in the training of the youth of this nation than has been its share heretofore. The men who will be faced with the duty of enforcing the peace, which is to follow, are now in the junior and senior high schools. What the schools do with them now will determine the kind of peace this world will have in years to come.

We look to men for leadership in running the ship of state; therefore, we must train our boys to be ready for this leadership. In most of the large cities boys on the junior high school level are required to take some course in the industrial-arts department. Here the boys are taught how to do things with their hands, but above all, they learn how to work together in a group. The industrial-arts department, therefore, can go a long way in the teaching of democracy, for it provides better opportunities for the teaching of practical citizenship than does the social studies department.

In the school shop, the boys are given certain liberties not granted in other classes, but with these liberties they are also required to accept certain responsibilities. The most important lesson that a boy can learn in school is the assuming of responsibilities which result in more freedom. In most shop classes a foreman is appointed who is charged with certain duties, and in fulfilling his duties he learns a valuable lesson in leadership. The class is rotated so that every boy gets the same training.

Another lesson learned in the shop is that of working for others and with others. The student is taught the lesson that his rights end as soon as they interfere with his fellow worker. He learns something of property rights because he must respect the property rights of his fellow worker, and he discovers that by following an orderly procedure, not only in his relations with others, but in his own work,

*Washington Junior High School, Ottumwa, Iowa

there is a resulting increase in work accomplished.

In the army a man advances in the ranks on the basis of what he can do under actual conditions. If he can hit the bull's eye the required number of times he is promoted. If he can repair an airplane motor and make it run satisfactorily he is advanced to the next rank. He advances only when he has mastered each job. When the war is over there are going to be decided changes made in our testing programs. It is going to be what can you do instead of what do you know.

In mathematics it will be: can you extract the square root of a number? Can you square a trinomial? If you think you can, "show me" is going to be the demand of those doing the testing. In the industrial-arts department it will be somewhat similar. Can you cut a mortise-and-tenon joint? Can you solder a joint in tinwork? Can you cut a Morris taper? Can you weld a piece of casting? To prove that he knows how to do it he actually does the work and submits his product for inspection.

In conclusion, may it be said that if the industrial-arts department does not use its facilities to teach democracy it is missing a great opportunity. The test of school shop work may be like the test given in the army. Can the student do it? They can if the instructors will only carefully check the results obtained in their departments.

What Shall We Teach?

LEONARD E. SCHMIDT*

It is a difficult task for the man who has worked for years at a particular trade not to think that his trade is the best of all. If he did not think so, he would have tried something else. When the worker becomes a teacher, he takes this feeling along with him, and consciously or unconsciously attempts to pass it on to his students.

This would not be so bad if all the students in his shop were positively going to become members of the trade they are studying. Unfortunately, many students are in the various shops because there is a law stating the minimum age for leaving school, and since they must do something, they have chosen that shop for one of many reasons, the least important, but probably most prevalent, being the fact that a friend is in the shop.

All too often we are guided by the license we hold. If it is for woodworking, we try to make all the students woodworkers. If it is for sheet metal, we try to make every boy into a sheet-metal worker. The writer's license is for printing and presswork, and when he started in the teaching field he did exactly what his instinct told him to do — he tried, without too much success, to turn every boy into a printer. True, some of the boys did very well, but many were not interested, and the time that was spent in trying to force printing on them could have been used to greater advantage had it been spent on the boys who really wanted to learn.

The things learned in those first terms of teaching made the writer change his methods. He now tells his boys at the start of the term all about the trade and its opportunities. He also tells them what he plans to teach them, what he expects from them in the way of conduct and the rules of the shop which they must respect. He then shows them samples of the work that was done by the boys of the past term in an effort to instill in them the determination to do even better. A few letters from former students, who are now working at the trade, are then read. This usually winds up the first session.

With the foundation thus laid, the next session finds the boys at the case doing the simplest things, such as setting single characters, just to get the feel of working with type. From this point on, he spends his time in keeping an eye on all the new boys. He notes those who do not seem to take much interest in their work. The boy who continues to show little interest is then taken aside for a talk about his plans for the future.

If he has no definite goal set, he is tried at feeding the press. This job has appealed to many boys who have no desire to work at the case. If feeding fails to interest him, he is tried at making posters. Since most people like to draw, it is often possible to get him interested in at least trying to letter, since he knows that the power will be used if it turns out well.

In this way he has found four boys this past term who, having no interest in printing, would have given him much trouble if their energies had not been used in making posters and signs. Their work has been of good quality, and some of their work can be found in the local town hall, post office, and Red Cross stations.

Another boy, after trying type, presses, and posters, reported that he couldn't do the work, and asked if there wasn't something else that he could do to keep out of trouble and assure himself of good marks. When asked what he thought he could do around the shop, he replied that he would like to keep the washroom clean.

Now certainly cleaning washrooms is a far cry from printing. Yet here was a boy in my shop, with no interest in the trade, asking for that work. Perhaps someone else would not have permitted him to go ahead with the work he had chosen, but the writer gave his consent, and the boy does this job every day and he does it well. He has not learned much about printing, but he has been helped to do something that he wants to do, and can do well. There is a place for a boy who can keep a place spic and span, and efforts are being made to place him at that kind of work. If I have aided him in finding a job, even though my license does not cover that work, then I feel that I have done my job as well as I could.

No, we cannot stop at the borders of our field in preparing our boys. All will not become good workers at that particular trade, and if we are to be of help to our chosen occupation, we should strive to turn out good craftsmen, though they be few in number.

There is a place for everyone in this world, and we can help some of the boys find theirs if we will just think of them as individuals, and not a mass of putty placed into our hands to be molded into tradesmen whether they have the ability or not.

*Lincoln Hall Vocational Shops, Lincolndale, N. Y.

WHEN THE BOY LEFT

Adam N. Reiter*

Jest turnin' eighteen years he was,
An' sech a wholesome lad;
So strong an' clean an' manlylike —
Th' only one we had:
But war ain't no respecter
Of th' wants of me an' you;
An' like he said th' day he went:
"We got to see it through!"

— Weren't no fuss er grumblin'
When come time fer him t' go —
Nor did he blame th' "draftin' board,"
Like some I chance t' know:
Instead — he smiled, an' said, "So long";
An' waved at Ma an' me,
Real cheerful-like . . . th' way I guess
He'd have us home folks be. . . .

An' Ma — she acted cheerful, too.
She never did "take on";
At least, there weren't no evidence,
'Til after he was gone:
But me; I'd planned a farewell talk;
An' didn't git it done. . . .
I couldn't think a word t' say,
Except, "God bless y' — son!"

*West Chester, Pa.

Problems and Projects

MAKING LANTERN SLIDES BY TRACING

ARTHUR W. TRUELL
School No. 50
Buffalo, N. Y.

Lantern slides are a recognized teaching aid in the modern school shop.

A very satisfactory lantern slide can be made by the tracing method. This method will appeal to many teachers, especially those who have little or no experience with photography.

The equipment for this work is limited. All that is needed is an extremely fine pen point (Esterbrook No. 32 and holder), India ink, ruler, thumbtacks, ground cellophane, and passe partout tape.

The ground cellophane may be purchased in a photography supply shop. This type of cellophane is the kind used to replace ground glass in photographic equipment. The cellophane comes in large sheets and must be cut to the required size. The best size is 3¼ by 4 in. More satisfactory results are obtained by using this size, as a smaller size would require a smaller picture which would be harder to trace. The cellophane must be cut with a paper cutter to insure accurate measurements and straight edges.

There is a wealth of material available for the making of these slides. There are always a number of pictures in catalogs, books, and magazines, etc.

A program must be planned in advance, that is, the subject should be chosen. For example, if the desired subject is sheet metal, all books, magazines, and catalogs are reviewed for the desired illustrations of the proper size. The book or magazine is tacked down, as shown in Figure 1. The ground cellophane is then placed over the picture and traced. Care must be taken not to have wavy lines. The lines must be very clear and black. Remember, all flaws are magnified when the slide is projected on the screen.

After the drawing is made and the ink is dry, it is placed between two pieces of clear cover glass of the required size. The three are then bound together with passe partout tape as shown in Figure 2.

A gummed label is placed at the bottom of the slide and the title is printed on the label. This label helps in placing the slide in the projector while in the dark. The slide is then ready for testing in the projector.

If you desire, the slides may be colored with photo oil colors.

The author has made several sets including sheet-metal tools and operations, woodworking tools and operations, machine-shop operations, the airplane in flight, and the helicopter in flight, and they have all stimulated much interest in the subject being taught.

The method just described is not limited to industrial subjects. It would also be of value to teachers of science, chemistry, and mathematics.

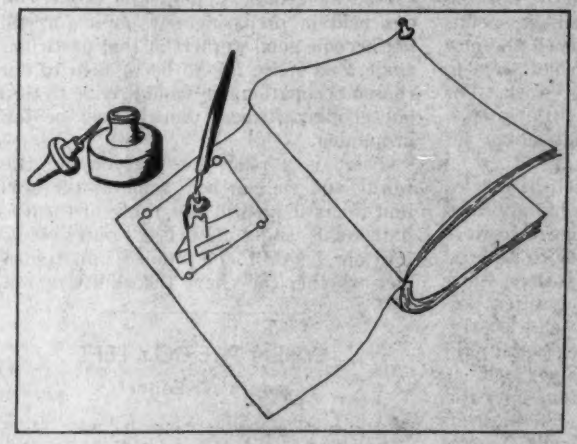


Fig. 1

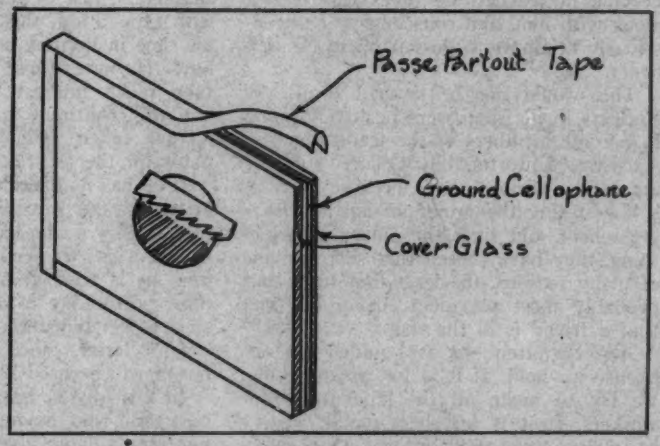


Fig. 2

INSTRUMENT PRACTICE WITH USEFUL GEOMETRICAL DESIGN

CHARLES M. RICE
Western Washington College of Education
Bellingham, Wash.

This problem is an elaboration of a *cut-paper design* of similar shape that was developed for use as a pattern for a folding coin purse made from leather by E. J. Sager,* after the twisted top of the well-known rubber tobacco pouch of earlier days suggested a folding pouch. The mechanical drawing instructor may use this design in his drafting room in the following different ways:

First, it may be used simply as a *drawing problem* in which the aim is to divide a circle carefully into a required number of segments;

*Lt. Col. E. J. Sager, Canadian Army, formerly of Vancouver, B. C.

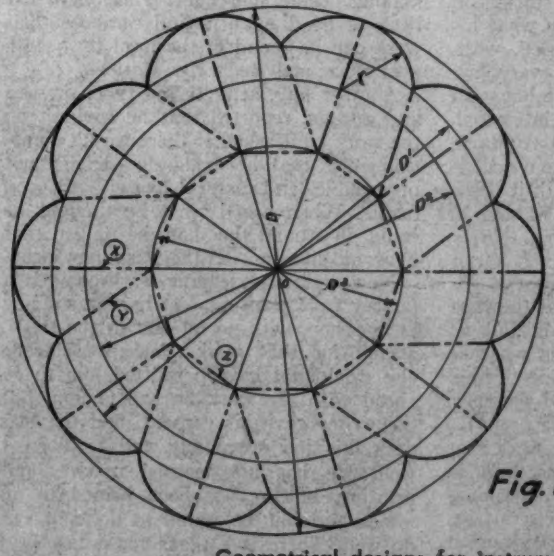


Fig. 1.

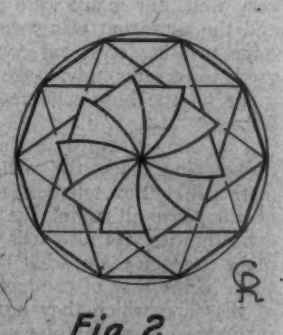


Fig. 2.

Geometrical designs for instrument practice

locate a number of concentric circles; draw a required number of sides of a polygon; and draw a number of arcs of equal radius tangent internally to a circle of a given diameter (Fig. 1). It may be presented as a *design problem* in which the student may change the dimensions or seek new proportions to the extent that the job becomes a problem in the creative design of a small container which folds up after the fashion suggested in Figure 2.

As a *test problem* in instrument drawing, and care in following directions, the pattern shown in Figure 1 may be withheld from the student and a sheet of directions given on a test sheet, perhaps in the following manner.

A Test for Drafting Ability

Follow these instructions carefully:

1. Draw four concentric circles having the following diameters: 6 9/16; 5 9/16; 4¾; and 3⅛ in.
2. Divide the outside circle into 10 equal parts and draw radii through the center, thereby forming ten equal sectors.
3. Using the intersection points, where these radii cross the 4¾-in. circle as centers, draw 10 arcs with a 29/32-in. radius.
4. Draw light *folding lines X, Y,* and *Z.*

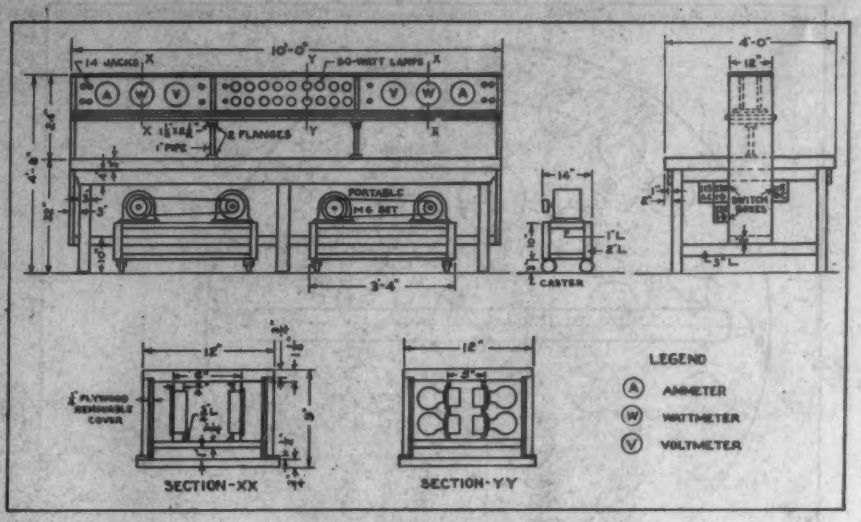
Now test your accuracy:

1. Trace the outline, using a 4H drawing pencil and tracing paper, carefully following the scalloped edge.
2. Fold the *X* lines upward, the *Y* lines downward, and the *Z* lines downward.
3. If the problem has been drawn and folded accurately the ten flaps should mesh exactly at the center. Have the result checked by your instructor.

TEST TABLE FOR ADVANCED ELECTRICAL WORK

BOYD M. HAAG
Langley High School
Pittsburgh, Pa.

The test table shown herewith is so arranged that d.c. experiments may be conducted on one side while a.c. experiments are carried on the other side. The main purpose of the experiments is to obtain the characteristics of various types of a.c. and d.c. motors. For the sake of uniformity the 4 a.c. and 4 d.c. motors are all of the same horsepower size. All of the machines are mounted on dollies so that any particular outfit may be moved quickly to any working position on the table. The machines themselves are secured to the dollies by angle iron devices in such a manner that any one of them may be placed in connection with any other machine quickly. All of the machines are equipped with V belts, and proper belt tension can be attained readily.

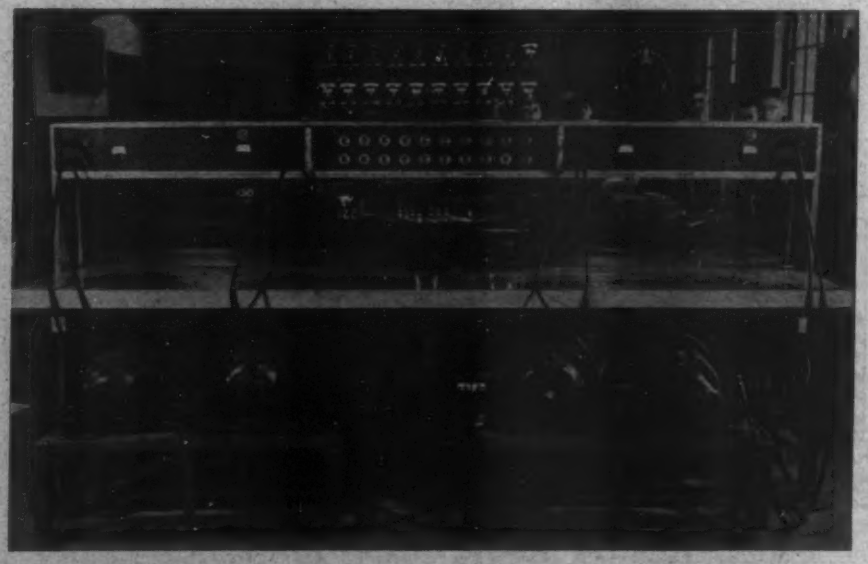


Test table for electric shop

All power sources, meters, and lamp loading banks are mounted in the panels constructed on top of the test table. Current is supplied to jacks of 25 ampere capacity located on the extreme ends of the panels on each side of the table, a.c. on one side, and d.c. on the other. In the sketch only the a.c. side is shown. The arrangement of these jacks permit the meters and load banks to be connected to the shop source of power or to a motor or generator under test. Power also is readily available for experiments conducted on the table top using additional meters and equipment. The lamps are shunted in or out to vary the load.

Current for all working positions is controlled by 15-ampere circuit breakers located at the ends of the table where they are readily accessible. Current is fed to the machines or from the machines to the panels by using suitable plugs and jumpers.

The meter and lamp bank panels are equipped with removable masonite covers fitted with locks and keys. This discourages any elementary class from tampering with the panel equipment at a time when the table is not in use. The table top is used for starting boxes and other equipment. In designing the table the fact that equipment must be set up and taken down with a minimum loss of time, due to short periods, was constantly kept in mind.



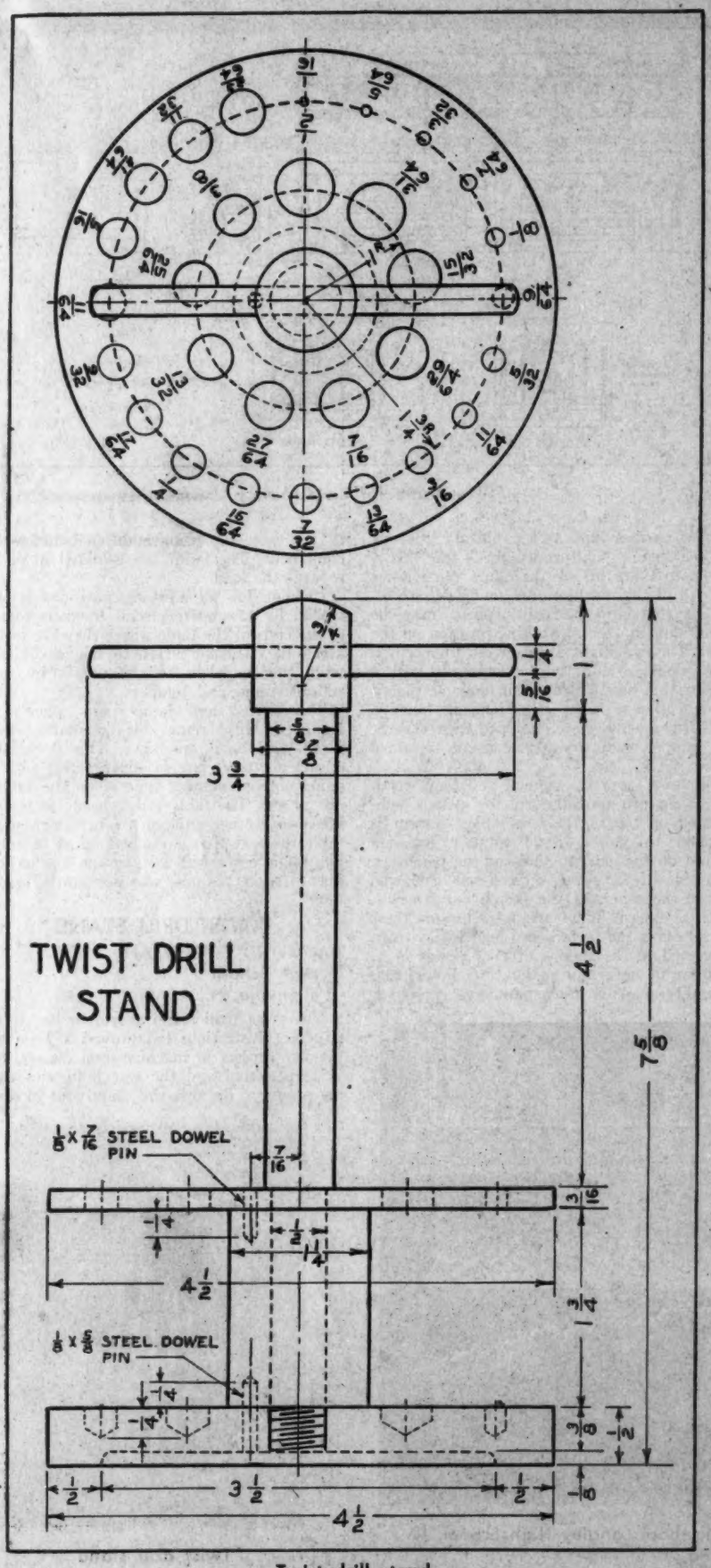
Electrical test table and part of electric shop, Langley High School, Pittsburgh, Pa.

TWIST DRILL STAND

RAYMOND C. GETMAN
High School
Ellenville, N. Y.

The twist drill stand shown in the accompanying illustrations has proved to be a very popular project in machine-shop classes, both in high school and the war industries training program. Because this stand aids in teach-

Twist drill stand



Twist drill stand

ing the care of tools, it is particularly suitable to the times.

This project has been made by several students for their home workshop. Its construction offers the student a means of gaining experience in performing several fundamental operations such as layout, centering stock on the lathe, turning to diameters, threading, tapping, drilling, and polishing.

Construction of twist drill stand:

1. Cut off a piece of ⅞ by 8-in. cold rolled steel.
2. Lay out and drill center holes for turning on the lathe.
3. Mount work between centers on lathe.
4. Turn to proper diameters according to the detail drawing.
5. Turn ½-in. N.C. threads on base of center post.
6. Cut off ¼-in. diameter cold rolled steel 3¼ in. long for handle. Chuck piece in collet and round ends.
7. Locate and bore hole in head of center post for handle.
8. Press ¼-in. rod in place to complete post.
9. Pieces for the body of the drill stand are cut out and center holes are drilled according to dimensions given.
10. Drill and tap base for ½-in. N.C. threads.
11. Place the upper disk and the base on a mandrel and turn them to the proper diameter.
12. Turn recess in base as shown.
13. The disks may either be faced off in lathe or filed and polished by hand.
14. Cut a piece of ¼ by 7-in. cold rolled steel, and face off one end in chuck on lathe.
15. Drill ½-in. hole through center while still in chuck.
16. Finish filing and polishing all pieces.
17. Lay out and center punch holes in top plate according to dimensions given.
18. Fasten pieces together with ½-in. cap screw and drill holes for twist drills. Holes are drilled ¼ in. deep in bottom piece.
19. Stamp drill sizes on top plate with steel numbers. Use ⅛-in. steel numbers and keep back from holes at least 3/16 in., in order that holes will not be closed up.
20. Assemble piece and align plates for twist drills.
21. Put in dowel pins to keep disks in position.

BOATBUILDING AS AN INDUSTRIAL-ARTS COURSE

J. A. EMMETT
Harryhogan, Va.

(*See article under same title in the May, 1944, issue, pages 187–190*)

The accompanying design shows a typical building procedure for those who work from stock plans or blueprints such as are mentioned in the previous article. Blueprints of this kind can be secured from a number of different sources for practically any type and size of boat. A comparatively simple model suitable for a first attempt at boat construction has been chosen. The information given has been purposely kept on a level with that found on the average set of plans that might be bought.

Figure 1 shows a plan view with inside and bottom views, and a profile or side view. It also shows a cross-section view of the construction, with a few detail drawings which cover the more difficult points of the construction. Figure 2 is a detail drawing which

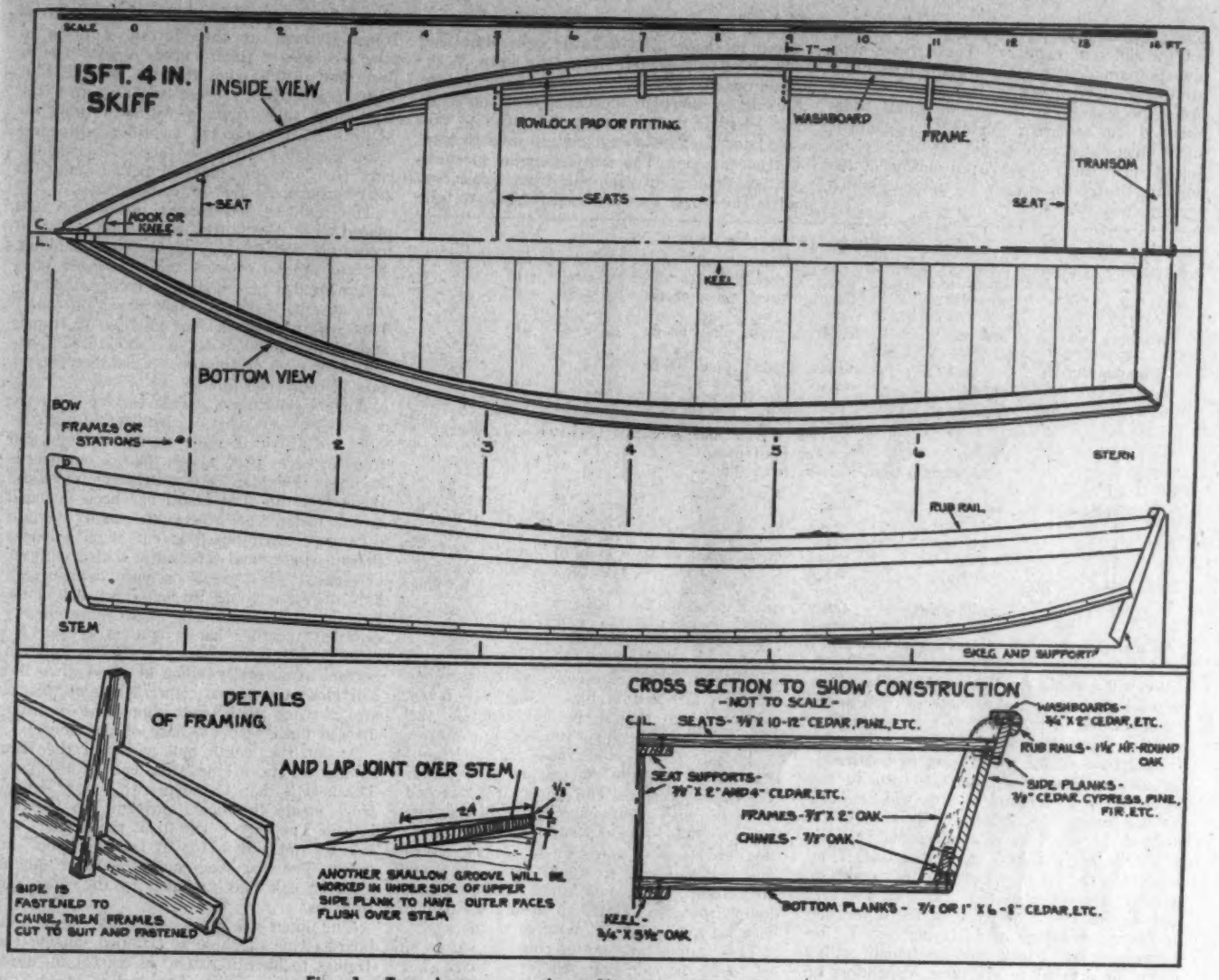

15FT. 4 IN. SKIFF
INSIDE VIEW
ROWLOCK PAD OR FITTING
WASHBOARD
FRAME
TRANSOM
SEAT
SEATS
SEAT
NOOK OR KNEE
KEEL
BOTTOM VIEW
BOW
FRAMES OR STATIONS
STERN
RUB RAIL
STEM
SKEG AND SUPPORT
DETAILS OF FRAMING
AND LAP JOINT OVER STEM
SIDE IS FASTENED TO CHINE, THEN FRAMES CUT TO SUIT AND FASTENED
ANOTHER SHALLOW GROOVE WILL BE WORKED IN UNDER SIDE OF UPPER SIDE PLANK TO HAVE OUTER FACES FLUSH OVER STEM
CROSS SECTION TO SHOW CONSTRUCTION
-NOT TO SCALE-
SEATS- 7/8" X 10-12" CEDAR, PINE, ETC.
WASHBOARDS- 3/4" X 2" CEDAR, ETC.
RUB RAILS- 1 1/4" HF.-ROUND OAK
SEAT SUPPORTS- 7/8" X 2" AND 4" CEDAR, ETC.
SIDE PLANKS- 7/8" CEDAR, CYPRESS, PINE, FIR, ETC.
FRAMES- 7/8" X 2" OAK
CHINES- 7/8" OAK
BOTTOM PLANKS - 7/8 OR 1" X 6 - 8" CEDAR, ETC.
KEEL- 3/4" X 5 1/2" OAK

Fig. 1. Top, bottom, and profile view of 15 ft. 4 in. skiff

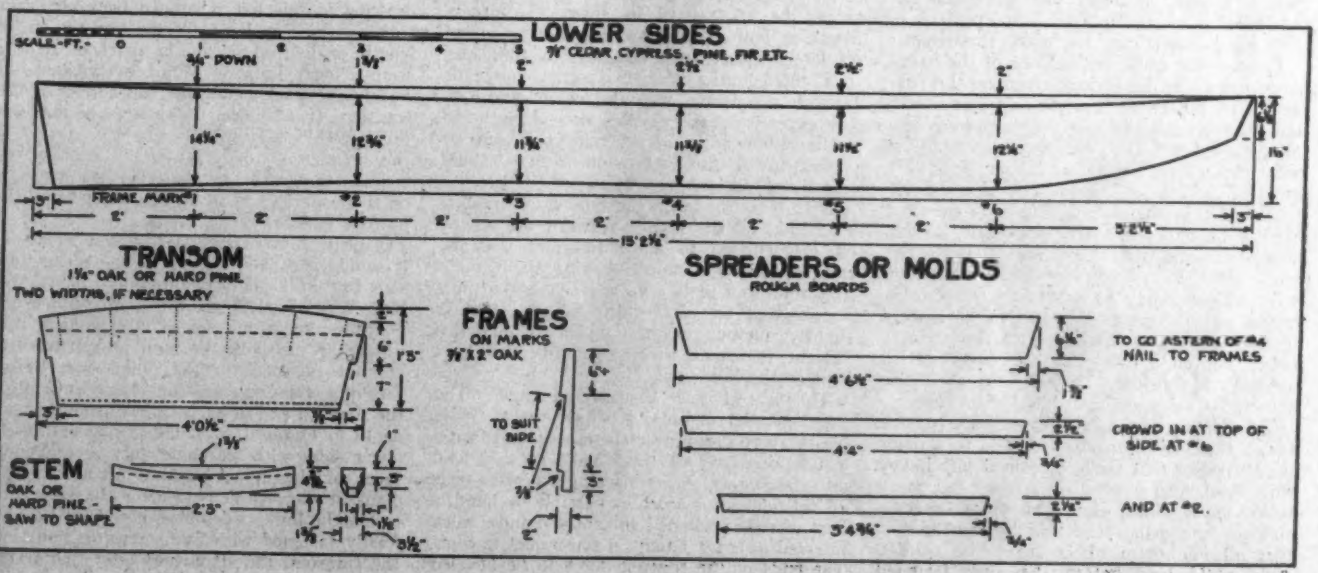


Fig. 2. Details of 15 ft. 4 in. skiff

gives the dimensions necessary for getting out the different members. These views supply approximately what a stock set of blueprints would give, but as mentioned, certain firms specializing in designs of small boats intended for amateur building supplement such blueprints with a bill of lumber required and with a step-by-step outline of the building procedure similar to the one which accompanies this article.

Lumber List for 15 Ft. 4 In. Skiff

Number of Pieces	*Name of Part*	*Material*	*Size*
2	lower sides	cedar, cypress, pine, or fir	⅞" x 16" x 16'
2	upper sides	cedar, cypress, pine, or fir	⅞" x 8" x 16'
120 running feet	bottom	cedar, cypress, pine, or fir	⅞" x 8" x or
150 running feet		cedar, cypress, pine, or fir	⅞" x 6"
2	chines	oak	⅞" x 5" x 12'
2	chines	oak	⅞" x 6" x 4'
1	transom	oak or hard pine (or use a wide and a narrow board to make width)	1¼" x 15" x 54½"
1	stem	oak or hard pine	3½" x 4½" x 30"
1	outer stem or trim	oak or hard pine	3½" x 4½" x 30"
30 running feet	frames	oak	⅞" x 2"
1	keel	oak	¾" x 5½" x 16'
1	skeg	oak	⅞" x 8" x 60"
1	seats	cedar, cypress, pine, or fir	⅞" x 10" (or 12") x 16'
2	rub rails	oak	1½" (or 2") half-round oak x 16' long
2	washboards	cedar, cypress, pine, or fir	¾" x 2" x 16'
1	spreaders	rough lumber	⅞" x 6" (or 6½") x 9'

All material should be free of serious checks, large knots, and other bad defects.

We will assume the design shown here has been selected for a first attempt at such work. Using the bill of materials as a guide, lumber may be secured either from a local mill or by sending to a dealer specializing in boatbuilding lumber. The main difficulty usually encountered is in securing boards wide enough for the lower sides. Such boards are usually stocked as *skiff sides*, and consist of the widest boards obtained from a cutting. They are left in the flitch or rough edged condition, so that any curve of the board, or the fact that its one end is wider than the other, can be taken advantage of in laying out the required pattern. Stock will be bought either rough, or dressed to thickness, depending on whether the school equipment includes a planer. A power band saw will come in handy, also a jointer, although one advantage of boatbuilding as an industrial-arts project is that hand tools can be used throughout.

To start the work, lay out one of the lower sides, using the dimensions given on the pattern. First put on the upright or frame marks and then lay off the top and bottom points along these lines. Then connect the established points by a long batten, or limber strip of 1 by 1-in. stock, and draw fair lines which touch most of the points. The ends are then marked off and the board sawed out, leaving a small amount of stock outside all lines. Then finally dress the whole piece down to the line, after which it may be used as a template in laying out its mate. Be sure to accurately transfer all frame marks to it. The stem is sawed out on a band saw or hewed with a hatchet and finished with a plane to the shape shown. Its sides are then beveled to fit.

To make the transom it is necessary to edge fasten two widths together. To do this, paint the two edges that are to be joined with heavy white lead, then fasten the narrower top board to the lower width, using 20d spikes, countersinking the heads. It should be remembered that all joining members are to be painted with white lead before they are fastened together.

The lower sides are used as a pattern for getting out the chine liners which must be sawed to shape, as 2-in. wide oak cannot be edge bent to the curve aft at the stern. Each chine piece is allowed to project ¼ in. below its side as shown in the detail of framing to avoid having to dress away too much of the side later when beveling made up sides to take bottom planking. The shorter lengths specified will give pieces for each side from frame No. 6 aft. The longer ones are used from there forward. The pieces are merely butted together and then fastened in place. Shape of lower edge of side should be marked on the chine stock first, then another line drawn to give a 2-in. width the entire length, after which the pieces can be sawed out and edges dressed. The sides are attached to these with fastenings perferably driven through the softwood of the sides into the hardwood of the chines to have them hold better. Use 1½-in. f.h. screws, brass or galvanized, spaced 4 in. apart staggered in a double row. Be careful to attach the chines on what will be the inside of each side.

The frames are gotten out in pairs — a set to fit the sides at each frame mark. The lower notch should take the chine stock; the depth of the upper one should equal the actual thickness of the sides; the top notch should be at least 6 in. long. The excess length at both bottom and top can be sawed off later. Frames are attached to the sides over their marks with two screws or nails through the frame into the chine, and five 2-in. screws or nails through the side into the frame. Pilot holes of a snug fit should be drilled for all fastenings so as to avoid splitting the wood.

With sides made up the boat is assembled. The ends of the chines forward are sawed off just enough to allow fastening forward ends of sides to stem, securing them there with screws or nails 3 in. apart staggered in a double row on each side. As the stem is slightly curved, and the end cuts on sides straight, the excess which must project here is kept at the bottom.

This has given a V-shaped assembly. The wide spreader or mold is slipped in at frame No. 4. Have it rest atop the chines, and fasten it temporarily with three nails at each end into the frames. After bringing the after ends of the sides in as much as possible by hand, a loop of rope is slipped about them and a stick inserted to twist it tight in tourniquet fashion. The ends of the transom have to be beveled slightly to take the sweep in of the sides when the sides are screwed or nailed securely to them. The spreaders for No. 2 and No. 6 frame stations are then forced in place to give the sides a fuller curve. A good eye is necessary at this point to have the hull fair, with stem erect, transom square across the boat, and sides running without humps or hollows. Shifting the last mentioned spreaders slightly attains this when they, too, are fastened to frames or chines or perhaps temporarily through the sides into their ends.

The hull is then turned bottom up and placed on leveled horses or blocking ready for truing up sides to take the bottom planking. A plane is used to work the sides down until a straightedge placed directly across the bottom at any point will rest wood on wood. This will require sawing off tips of frames and bottom of stem to suit, and then beveling lower edge of transom so planking can be carried right over all.

A good precaution against leaking is to lay a paint soaked strip of flannelette atop the side and carry it right over the stem and transom edge. Then fasten the bottom boards in place. Planking is commenced amidships; then after this first board has been fastened down, fasten the others alternately toward each end. Each board is cut slightly longer than necessary and screwed or nailed with six or eight 2½-in. screws or nails at each end, half of these going through into the chine, half into the side. The planks are merely crowded together hand tight in laying. No calking will be necessary with this type of bottom as natural swelling of wood when wet will close the seams tight. When all planks are in place, their ends should be carefully dressed flush with the flare of the sides.

A slot the length and width of the skeg should be cut in the after end of the keel. The keel is then fastened with screws driven from inside the boat, through the bottom, into it. The skeg is cut to fit the bottom, set into its slot and it, too, is fastened from the inside. The rear skeg support is made out of leftover oak and fastened to the skeg and transom.

The upper side planks are made out of 8-in. boards. One of these is clamped outside the frames to have it extend at least 1 in. down over the lower side. The outline of the top of the lower side is marked on it from inside the boat when it is removed for sawing and dressing to this line. Clamped back on again to allow the 1-in. lap to be uniform the entire length of its top outline is marked. At the stern a mark is made ¾ in., or thickness of washboard stock below the top corner of the transom; then another mark is to be made at the bow 6¼ in. up from the lower edge of this plank. A 16-ft. batten is clamped or tacked temporarily in place to have its ends on these marks and to be 4½ in. up from the bottom edge between frames No. 4 and 5. The bend of the batten is checked by eye — it should run in a true curve up to the transom but in a slightly straighter line to the bow. When thought right, a line is drawn, the board removed and sawed and planed, after which the piece can be used as a pattern to get out the one for the other side. Before fastening these pieces, the long lap joint at the forward end of each side, as shown in the detail in Figure 1, will have to be cut in the lower sides with matching ones in the under faces of the upper ones to permit the top planks to be caried flush over the stem, and to lap the lower sides elsewhere. Each side is finally fastened with five screws or nails into the transom, the stem, and into each frame. Then 1½-in. screws are driven on 4-in. centers along the length of the lap.

Fig. 3. This made-up side is for a larger boat than the one shown here but construction is identical with chine and frames fastened in place

The seats are fitted next. They are important cross-strength members and should be a tight fit against the sides. They also should be notched about the frames to throw some of the strain on them, and they should be fastened to the top edges of the lower sides. Then the molds may be sawed or split for removal.

The gunwale construction shown in Figure 1 is merely a suggestion as the washboards could be omitted when the heads of frames would be merely neatly rounded. As shown they are sawed off at the level of the sheer or top of sides so the washboards can rest atop them and a shallow notch is cut on each side in top edge of transom to take their after ends. Clear 2-in. wide stock will edge bend to curve of sides if fastening is commenced forward and the piece sprung as fastening proceeds. Where common stock is used it may be necessary to saw pieces to shape forward and depend on bending for the after half. The washboards are allowed to project over the sides enough so that their edges may be finally dressed flush with the flare of the sides, after which the half-round strips are fastened on to cover the seams. A small triangular-shaped block can be set in, between the sides and behind the stem, for trim and to add strength.

The ends of the sides forward are dressed down flush with the face of the stem. Then a false or outer stem is put on to cover them. Its thickness should be such that the end grain of the sides will be covered and it can be steam bent or more likely sawed to shape to suit the curve of the stem. Finally, it should be spiked into the stem, after which the sides are dressed to carry out the lines of the sides, finishing with a leading face of about ¾ in., to give the effect shown in profile plan in Figure 1. The excess stem at the top should be sawed off to project 1½ in. A ⅝-in. hole should be bored through it to take a painter or rope. Stock rowlocks or oak blocks with holes for the pins of the rowlocks should be well fastened over the washboards at the locations shown.

Fig. 4. Coaxing in the ends to take the transom so that bevel of its ends can be determined

Final finishing includes countersinking any missed fastenings, then sanding inside and out. After a priming coat of paint has been applied all checks and cracks should be puttied, after which two or three coats of marine hull and deck paint of the desired shade should be applied.

Apart from its worth as a shop project the completed boat gives a usable and long lasting product. Its building should serve as a definite groundwork for later construction of either a larger boat or a small but more difficult to build type.

LIGHT FOLDING CHAIRS FOR THE ARMED FORCES

FRED DECKER
Head of Vocational Department, and
ARVO NORDLUND
Teacher of Woodworking
Southwestern High School
Detroit, Mich.

Parts for 500 light folding chairs have been manufactured and assembled by the Southwestern industrial-arts department for the American Junior Red Cross. One wood patternmaking class and the woodworking departments of the five ninth-grade general shop classes helped to meet this vital need for folding chairs in hospitals and recreation centers.

Chairs of this type must be made of straight grained hardwood to withstand much handling and use. Straight grained hardwood is very hard to buy. The Red Cross, however, was able to supply all the lumber necessary to build the chairs.

The chair breaks down into three main parts: the seat, the front legs, and the back legs. In order to simplify and speed the pro-

Assembling the backs

Assembling the seats

duction of the chairs, three jigs were built to assemble the seat, front legs, and back legs.

The lumber was sent to the school cut to thickness and width, but it had to be cut into the various lengths. Not having a circular saw, the lumber was sawed to length on the band saw. "T" squares were used as guides to cut the pieces square. Stops were clamped onto the band saw table to get all pieces to exactly the same length.

The pieces then were cut to correct thickness, width, and length. Other cuts were then made on the band saw. Stops were set up on the drill press for drilling all the holes for screws, stove bolts, and nails. The countersinking for all the stove bolts and screw heads was done on the drill press.

The pieces all cut to size, drilled, and countersunk were ready to be assembled. The parts were all fastened with nails and screws. The three parts were then assembled to make a light folding chair.

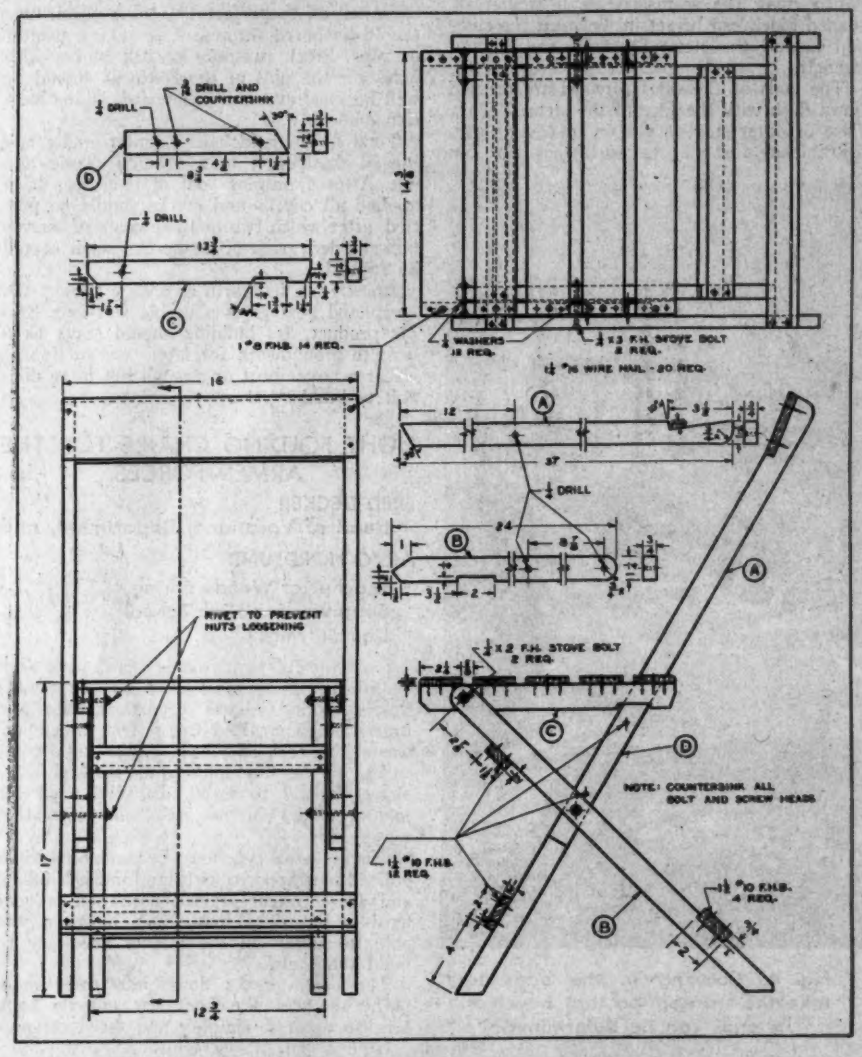
The nuts on all the stove bolts were riveted to prevent loosening.

The chair was then sanded smooth and was finished natural with two coats of varnish.

It should be remembered that before making chairs or any other articles for the armed forces, the National Headquarters of the American Red Cross, Washington 13, D. C., should be contacted, so as not to duplicate work that is being done elsewhere.

All bench woodworking was discontinued until the Red Cross request for the 500 chairs had been fulfilled.

The boys building these chairs have had the privilege of doing something definite for the boys and girls in the armed services of the United States. They also learned the extreme need of teamwork. They learned how chairs are made by wood products companies by using drill presses, and how to assemble jigs as they are used in the industrial plants.



Light folding chair produced for the armed forces

BILL OF MATERIALS

Part	*Number required*
Back legs	1,000
Front legs	1,000
Seat batten	1,000
Filler block	1,000
Leg spreaders	1,500
Back rest	500
Seat slat	2,500
Bolts	7,000
Washers	5,000
Screws	15,000
Brads	10,000

WHITTLING-JACKKNIFE TECHNIQUE

W. BEN HUNT

Hales Corners, Wis.

(Continued from page 286 of the September, 1944, issue)

Lapel Ornaments and Earrings

For this issue we are showing a few pieces of the popular costume jewelry. See Figures 152, 153, 154, and 155. As the pieces are all rather small it is best that hardwood is used. Everything but the mask shown in Figure 152 was made of cherry wood. The mask was whittled of mahogany. Birch would be just as good. The pins, that is, the larger pieces

Assembling the parts

Finishing the chairs

Fig. 154. The sanded lapel pins

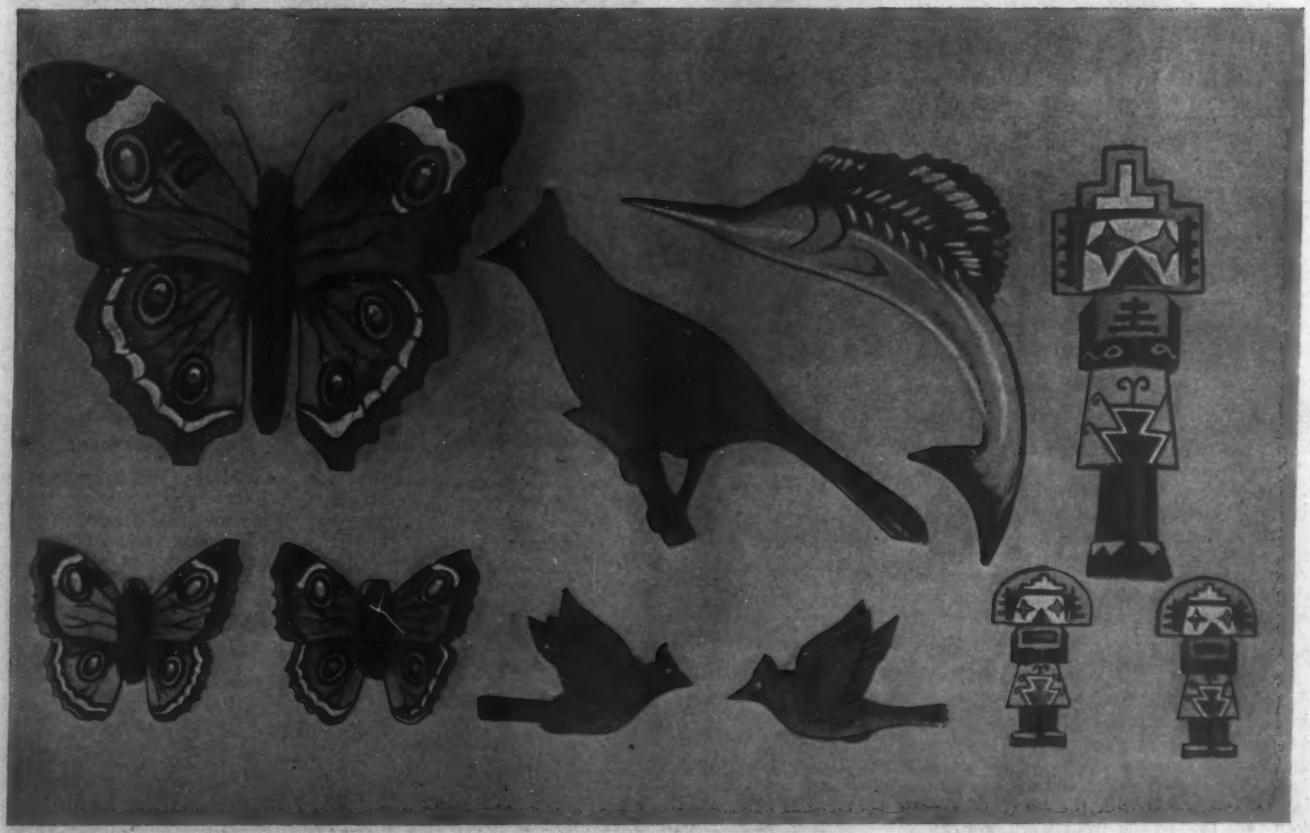


Fig. 155. The finished lapel pins

may be made of ¼-in. wood while the earrings should be whittled of ⅛-in. wood. The butterflies are perhaps the hardest things to whittle because the wings should be trimmed down rather thin. The butterflies shown are of the buckeye variety, and any book on butterflies will show how to paint them. If

Fig. 152. Full-size pattern for mask lapel pin

some other variety is desired a picture of the chosen butterfly may be copied from a book or from a colored picture.

After having drawn the patterns on the wood, cut out the silhouette with a jeweler's saw, a coping saw, or a jig saw.

The cardinal bird set is easily whittled and colored. The back is perfectly flat. These birds are a bright red with a few black markings as indicated in Figure 155. In Figure 153 there is a sketch of an earring fastener. These can usually be obtained at the notion counters of department stores. They are made of plastic or sometimes of metal, and are cemented to the back of the earrings with any of the various kinds of waterproof cements. Sometimes the part of the fastener which is to be attached to the ornament must be cut down so as not to project over the edges. This is often the case with katcina doll earrings.

The katcina dolls are made like those previously shown, but flat at the back. As with the butterflies and cardinal birds, the dolls and the butterflies belong to a set, although only one earring drawing is shown for each of them, since both the right and the left earrings are alike, whereas with the birds, they must both face toward the front when worn.

The sailfish is made and colored like the one shown in last month's issue, except that

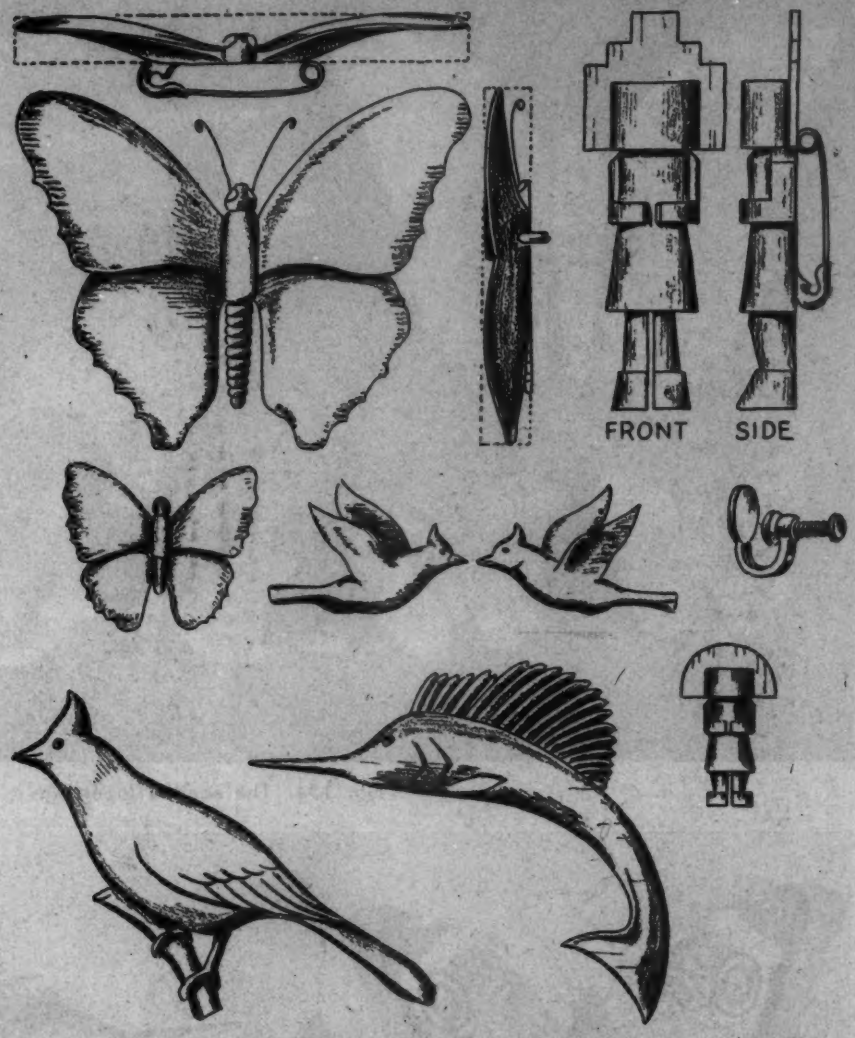


Fig. 153. Full-size patterns for lapel pins

it is flat at the back. No earrings are shown to go with this pin as they would not fit so well on the ears. All articles should be painted with water colors and be given two or three coats of clear fingernail polish.

The mask shown in Figure 152, can be whittled of ⅝-in. stuff as shown. If walnut, mahogany, or cherry is used you can finish it in the following manner. The eyes are white with green pupils, the eyebrows black, and the lips red. Two or three coats of clear fingernail polish applied after the water colors are dry, will give the wood a beautiful flesh color.

HOW TO FOLD A BAND-SAW BLADE

CHARLES M. RICE
Western Washington College of Education
Bellingham, Wash.

This step-by-step method of folding a band-saw blade is presented by the writer in the hope that it will serve a useful purpose in teaching the novice to quickly learn, as well as retain, a procedure in doing an important job in the shop.

Step 1

Step 1: Grasp the saw blade in both hands, with the index fingers pressing against the back edge of the blade, which is toward the body. The hands should be about *three feet apart* and the blade should rest on the floor at the lower end of the loop, where it is held in place by the left foot of the operator. See Figure 1.

Step 2: Pressing against the back edge of the blade with both index fingers, move the

Step 2

Step 3

Step 4

Step 5

arms toward the center of the body and at the same time releasing some of the pressure upon the blade by the left foot. See Figure 2.

Step 3: Proceed with the foregoing movement, crossing the two parts of the blade to form a "figure eight" at the top near the hands. This actually starts three loops. See Figure 3.

Step 4: Continue the movement, bringing the two loops of the "figure eight" close to the body, thus forming *two circular loops* which are, in turn, grasped by both hands. See Figure 4.

Step 5: Continuing the movement, thrust the two loops somewhat downward and away from the body, and releasing the hands, allow the two loops to fall to the floor where they will come to rest within the larger loop, from which the left foot has been removed earlier. See Figure 5.

If the blade needs to be folded into smaller coils, the operation should be repeated. First lengthen out one of the coils, at the same time holding the other two on the floor with the left foot; then proceed to fold the blade again according to the steps just given.

A TIN CAN PHOTOPRINT WASHER

CHARLES M. RICE

Western Washington College of Education

Bellingham, Wash.

Here is a practical metalworking project that can be made from secondhand materials. The construction of this print washer will give experience in soldering, bending, and wiring, and also a little pattern drafting and opportunity for design changes. As a project, it has that quality which incites pupil interest, and the instructor will find it serves as a part of an inexpensive outlay, whether singularly or on a production basis, for a photography class or the school camera club.

Scarcity of materials may suggest changes in methods of construction other than the ones illustrated in this article. However, if the basic design is followed, the circulation of the water in the tank will be excellent.

Fig. 3. Photoprint washer

The tank of the small washer, shown in the line drawing, is made from a 5-quart motor oil can such as used as sealed containers by certain oil companies. A washer for enlarged prints (Fig. 3) may be constructed from a floor-oil drum.

The illustrations show two types of cradles for holding the tank, one of metal and the other of wood. Also, two types of outlets with antisplash features are given.

Procedure

1. Select a 5-quart oil container. Place on a bench and turn the can until the punctured hole at the end reaches the top, this being important at the beginning because the hole, slightly enlarged, serves as the overflow for the tank. Now draw a center line, in line with the hole, leading from end to end of the can. Measure 2¾ in. to each side of this center line, at each end, and scribe lines to represent the edges of the top opening of the tank. Within these lines, and including the two ends, scribe more lines as shown by dotted lines at *1* in Figure 2 for the wire roll.

2. Carefully cut away the metal inside the lines just made with a pair of tin snips.

3. Remove the paint along the edges of this hole by first heating the metal a little and brushing the surface with a cloth or a wire brush if one is available, thus preparing the surface for soldering.

4. Prepare for the wire roll by bending the edges of the opening upward with a pair of pliers. See the first can in Figure 1. Notch the edges at the ends as shown.

5. Bend a piece of wire around this opening with the two ends meeting at the center of one of the sides.

Fig. 1. Photoprint washer

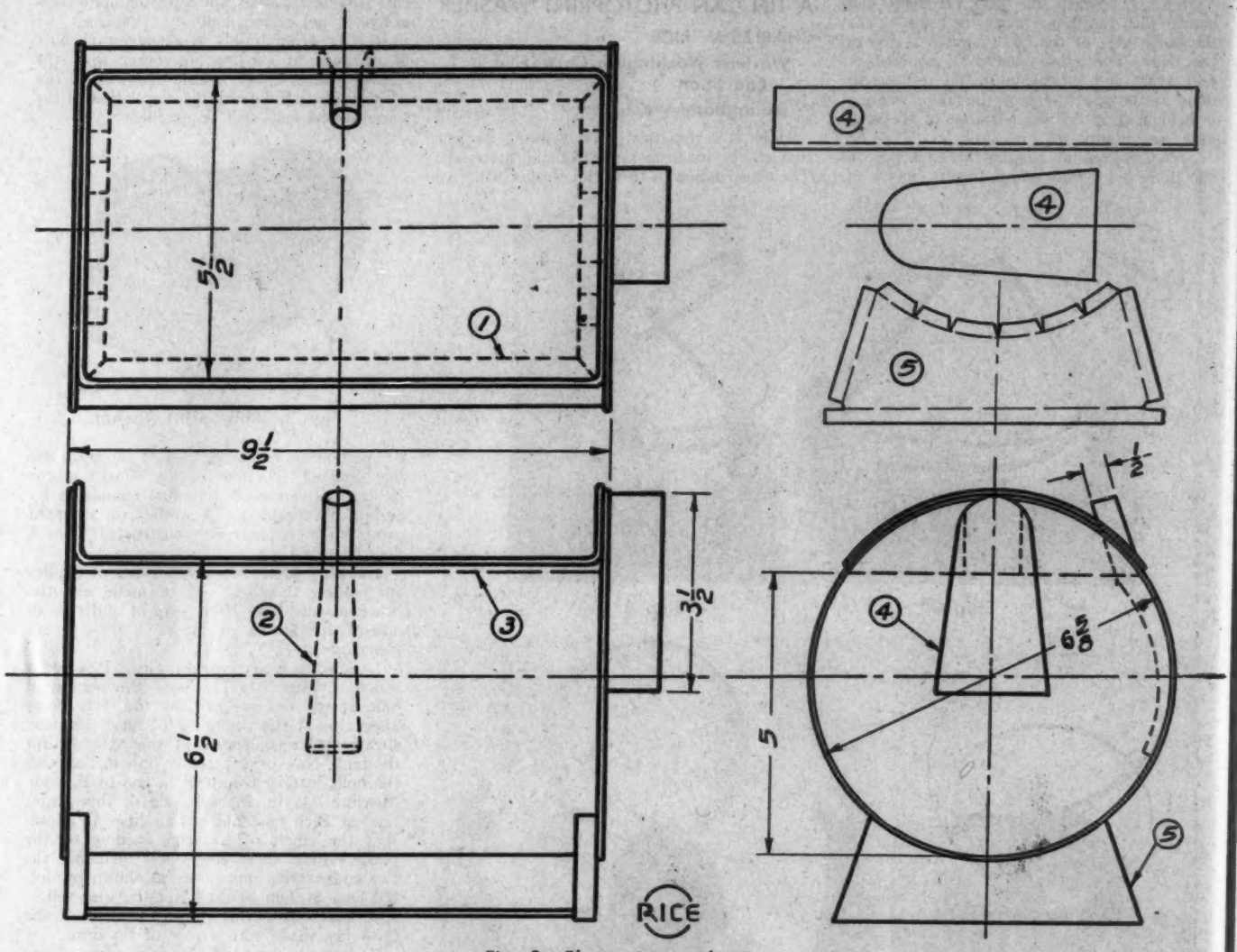


Fig. 2. Photoprint washer

6. Bend the metal around the wire as smoothly as possible with the pliers.

7. Solder along the wired edges and remove any sharp projections with a file.

8. Enlarge the drain hole so that the outlet will be lower than the wired edge. See the water level at *3* in Figure 2.

9. Draw a paper pattern for the ends of the tank support. See *5* in Figure 2, for a suggested sheet-metal pattern. Make two parts.

10. Cut two pieces of heavy galvanized wire and solder between the two ends of the cradle, and then in turn, solder these end-pieces to the tank body.

11. Draw a paper pattern for the no-splash spout shown at *4* in Figure 2, and cut out the metal pieces. Bend and solder in place over the drain opening.

12. Find a piece of copper or brass tubing, ½ in. by 5 in. long, and flatten it at one end, fan shaped, as shown at *2* in Figure 2.

13. Solder the piece of tubing in place, leaving enough extend above the edge of the opening so that the inlet hose may be attached. See Figures 1 and 2.

14. Clean the surfaces well with hot water and soap. Dry and paint with two coats of enamel or asphaltum varnish.

15. Attach a hose having an attachment socket for the water faucet.

AVOIDING MASHED FORMS

J. ORVILLE WOOD
Printing Instructor
South High School
Pittsburgh, Pa.

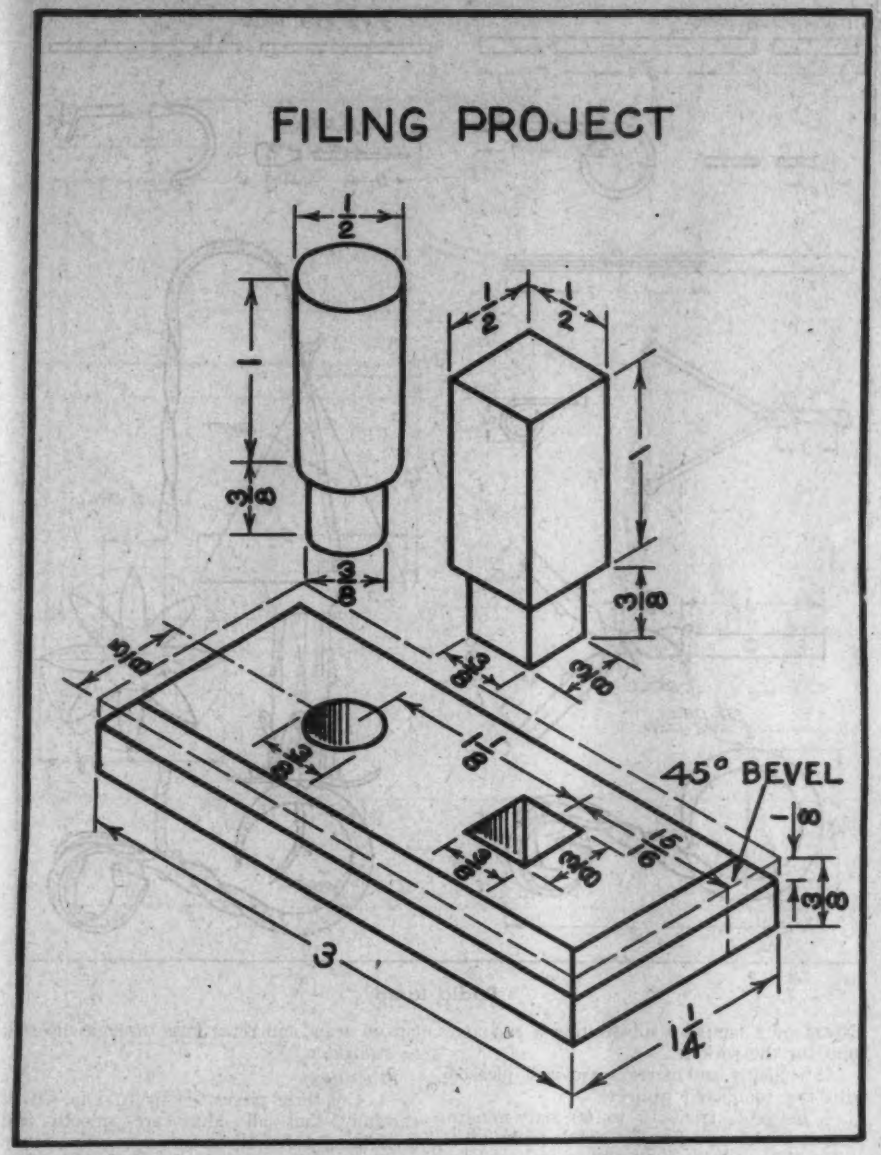
One source of mishaps in a print shop, especially in a school print shop, that results in mashed type is the careless replacing of the type form in the job press. Of course, this means the instances where the gauge pins have been placed and possibly the right-hand gripper set, and then the form was taken out of the press for a correction and put in the press again, but turned around in a different manner than that of the first time. We generally place a job in the chase a little above the center for easier feeding; this makes the type lower when the form is turned around, and it will always strike the bottom gauge pins, and possibly the grippers, too, when an impression is taken. This not only ruins the patented pins, which cost 15 cents each, but the type is mashed also at those particular places.

Although the students are cautioned to be careful when putting a form in the press and to be sure that the quoins are at the top, except where the job is such that the quoins must be placed at the bottom of the chase to facilitate feeding, nevertheless, students often are thoughtless, and at times the form will go in the press in the wrong way. When that happens, unless the supervisor is at the press to check on the various operations as they progress, various things may go wrong. To avoid this, one edge of the chase is marked with white paint "Place this edge up in press" as a guide to the lockup man and to the pressman and feeder. Now when the stoneman locks up a job, he places it in the chase so that the edge with the message can be placed toward the top whenever it is put onto the press. The scheme has worked well, and for several years we have had no accidents because of placing the chase upside down in the press.

FILING PROJECT

C. F. ZAENGLEIN
High School
Circleville, Ohio

Teachers in general metal shops are often in need of new supplementary problems which may be given to the students who finish their projects far in advance of the average students. The filing project described herewith



may be assigned to such students, or it may be given to the class as a precision test problem to determine the standing of the boys in the use of a file.

Since the file is used by so many different mechanics, it behooves shop teachers to offer more filing projects to the students who will be our future mechanics.

The filing problem shown was designed and used in our metalwork class this year and it proved to be a real success.

The project has several advantages: (1) it holds the interest of the student, because he sees at a glance its purpose, namely, to work to a finer degree of precision with the hand file; (2) the student also realizes that it is a short time job; (3) a very small amount of material is needed.

BILL OF MATERIALS

No. of Pieces	*Material*	*Size*
1	Mild steel	3/8 x 1¼ x 3 in.
1	Mild steel, round stock	½ x 1½ in.
1	Mild steel, square stock	½ x ½ x 1½ in.

Tools Required

Three-cornered file, smooth-edged mill file, try square, bevel square, center punch, and drill press.

Method of Procedure

Square up the flat piece to exact size. Lay off and center punch places for the round and square holes as indicated in drawing. Drill the two holes using a 3/8 in. drill bit. Lay off bevel lines 3/8 in. all around as shown in drawing and file bevel, making a 45-deg. angle. File out one hole 3/8 in. square using a three cornered file.

Lay off round stock as shown in drawing and file a tenon to fit the round hole. As the work progresses to a near fit, the testing should become more frequent and the filing should become lighter and the strokes less numerous. A flat mill file with a smooth edge should be used for both tenons to prevent the tenon from becoming longer.

Lay off square stock as shown in drawing and file a square tenon to fit square hole in block. Use the same precaution as given in filing the round tenon. The last few strokes should be single strokes between tests.

A pressed fit may be used by placing the project in the jaws of a vise and forcing the tenons into the mortises. Smooth up all rough edges and apply a film of oil to prevent rust.

A SIMPLE NAIL CABINET

JOHN W. DEAN
Arlington Heights, Ill.

The basis of this cabinet is a number of small tin baking pans such as may usually be purchased for five cents each. They would measure approximately 2 by 4 by 6 in. Larger sizes may be had for bolts; smaller sizes are sometimes available for small nails, brads, screws, etc. The pans are much cheaper, better, and more uniform than anything you might be able to construct from wood.

Plan the cabinet to have a depth about ½ in. greater than the length of the pans; the height and width will depend on the number of pans. They are supported by the rims on the sides which slide into grooves in the sides and partitions of the cabinet. These grooves — about 3/16 in. wide and ¼ in. deep — should be spaced very uniformly, about ½ in. farther apart than the height of the pans. Allow for a ½ in. space above the top pan and also below the bottom one.

The height and width of the cabinet may be varied to fit the place where it is to hang, or to stand. The illustration shows two hangers made of strap iron for hanging it on the wall. A wood cleat may be nailed below for additional support.

The top and bottom boards may project a little at the front and sides or they may be made to fit exactly. The former is recommended. Stand the grooved boards on edge and insert enough pans to keep them properly separated. Measure the over-all width and add about an inch for the length of the top and bottom. Cut the boards to size and chamfer the upper edges of the front and ends. The back edges may be rabbeted to receive the back panel, as may also the back edges of the upright sides. Partitions should be trimmed to equalize the depth.

A nail cabinet

Locate the partitions by lines squared

across the top and bottom boards and nail them temporarily. Do the same for the sides, allowing space enough for an easy sliding fit for the pans. Nail securely and square the whole framework with a carefully fitted panel.

The interior of the cabinet may then be shellacked and the outside painted to match the woodwork of the shop or the gray of the machinery.

The simple method of numbering the pans (on both ends) eliminates all need of trying to keep identifying labels on them. In the average shop it is impossible to anticipate every kind and size of nail that will be used. There will seldom be more than twenty or thirty varieties, so provide plenty of pans and keep the smaller nails in those bearing the lower numbers, and the larger ones in the pans having larger numbers. You will soon learn where to look for the size you are using most.

It is recommended, for many reasons, that too many nails should not be placed in a pan at one time. Also that a student take the pan to his bench and use nails directly from it instead of dumping out a great many, using a few, and leaving the rest to be wasted or possibly returned to the wrong pan.

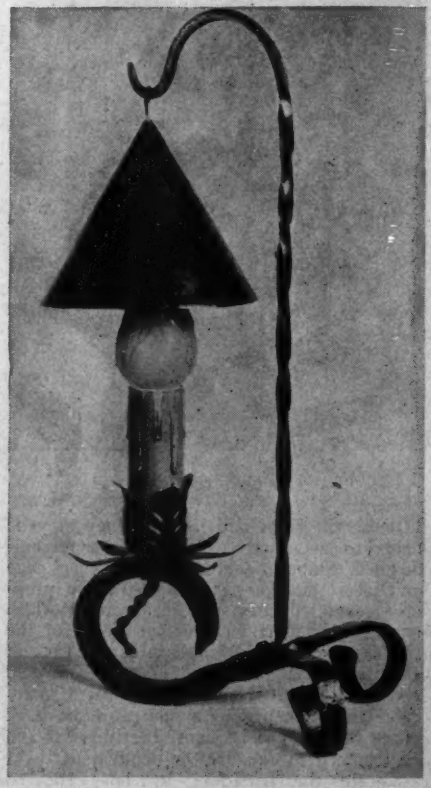
The last pan may be used for receiving unidentified nails, to be sorted periodically.

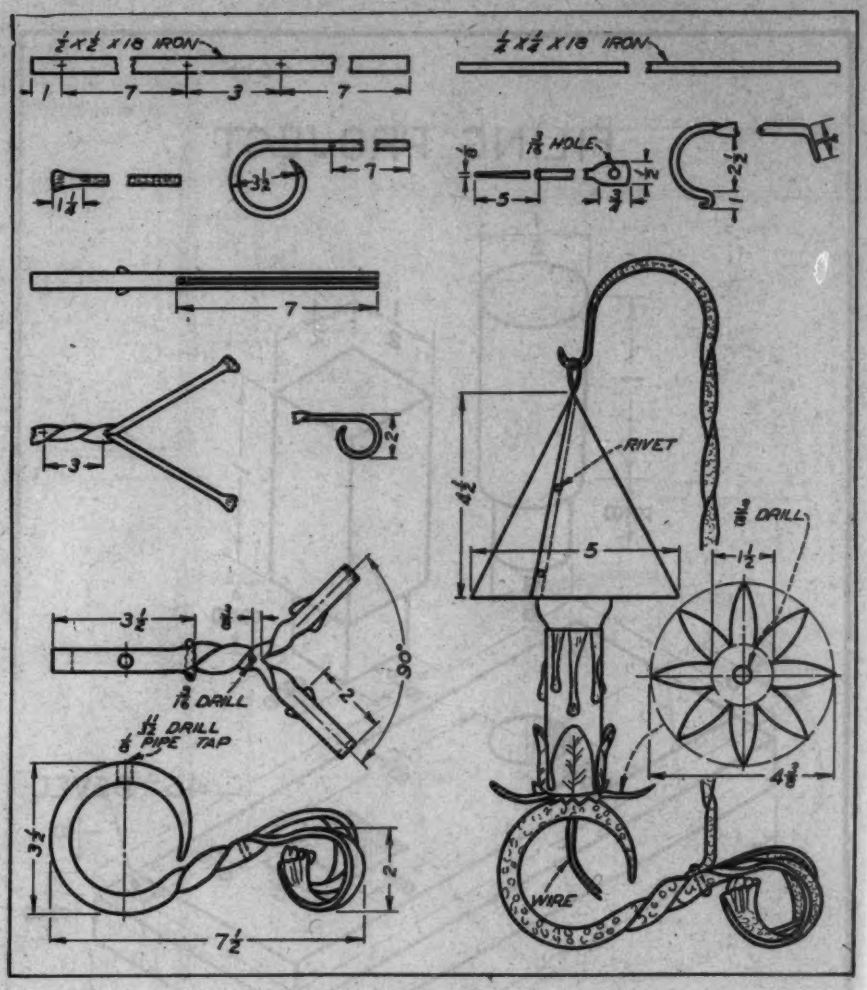
RADIO LAMP

DONALD B. MC KAY
Long Beach, Calif.

The radio lamp illustrated in this article was used a number of times as a required project in different classes. Experience with this project has developed the following facts:

1. Cost of material without electric socket less than 5 cents.
2. Can easily be used as a candle holder instead of a lamp by substituting a cup and tulip for the socket.
3. Students and parents are well pleased with the completed project.
4. Requires from 10 to 60 sixty-minute periods for construction by eighth-grade boys.





Radio lamp

The following type of jobs are involved in construction:

1. Measuring with a scale
2. Splitting with a hack saw
3. Forging a scarf
4. Forging scroll over horn of anvil
5. Hot twisting
6. Cold twisting
7. Drilling with power machine
8. Riveting and use of rivet set
9. Making a smoke finish or heat coloring
10. Developing a cone and use of tin snips
11. Use of a bending *U*
12. Polishing with emery cloth
13. Use and care of lacquer
14. Tapping threads
15. Wiring a socket
16. Locating hole with a center punch

SHEET-METAL MEDICINE SHELF

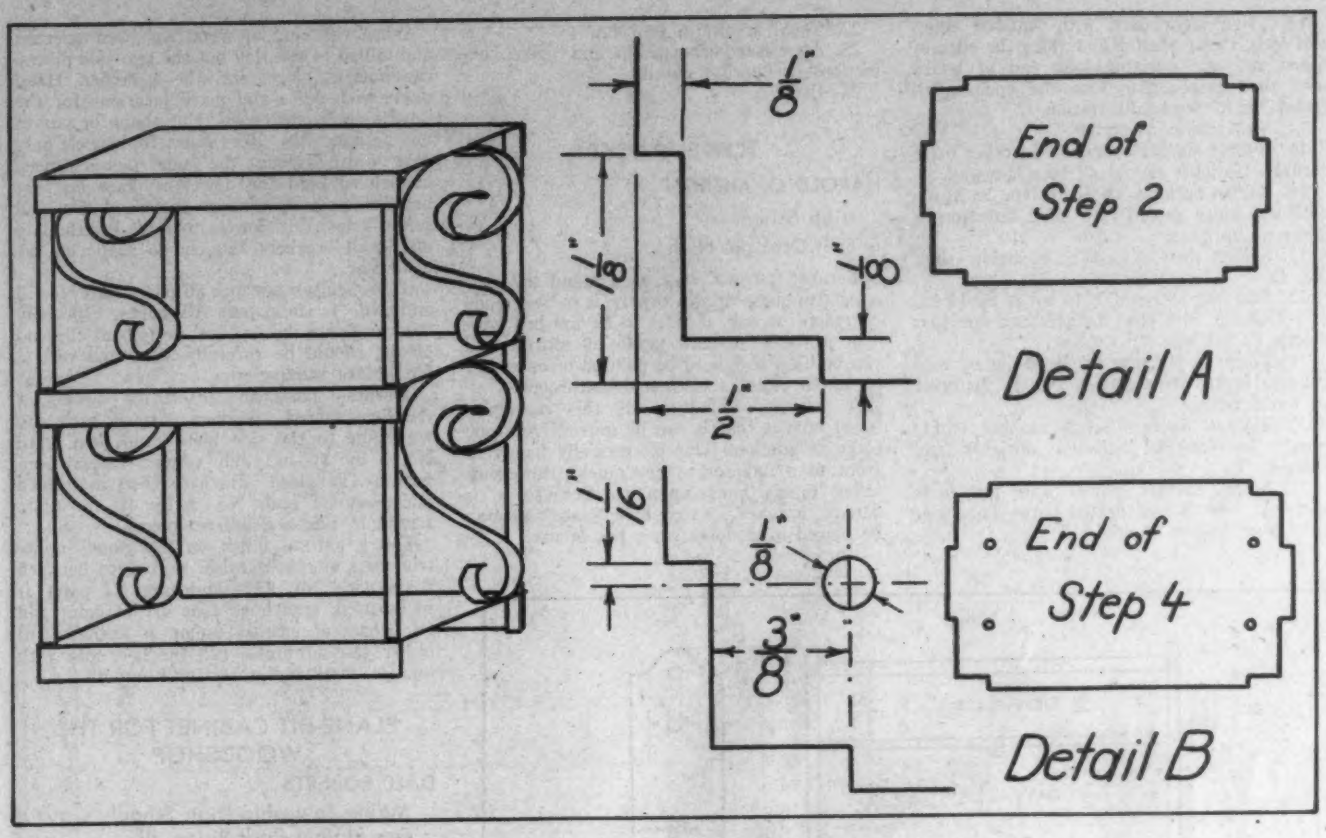
JOHN P. GRIFFIN
La Jolla High School
San Diego, Calif.

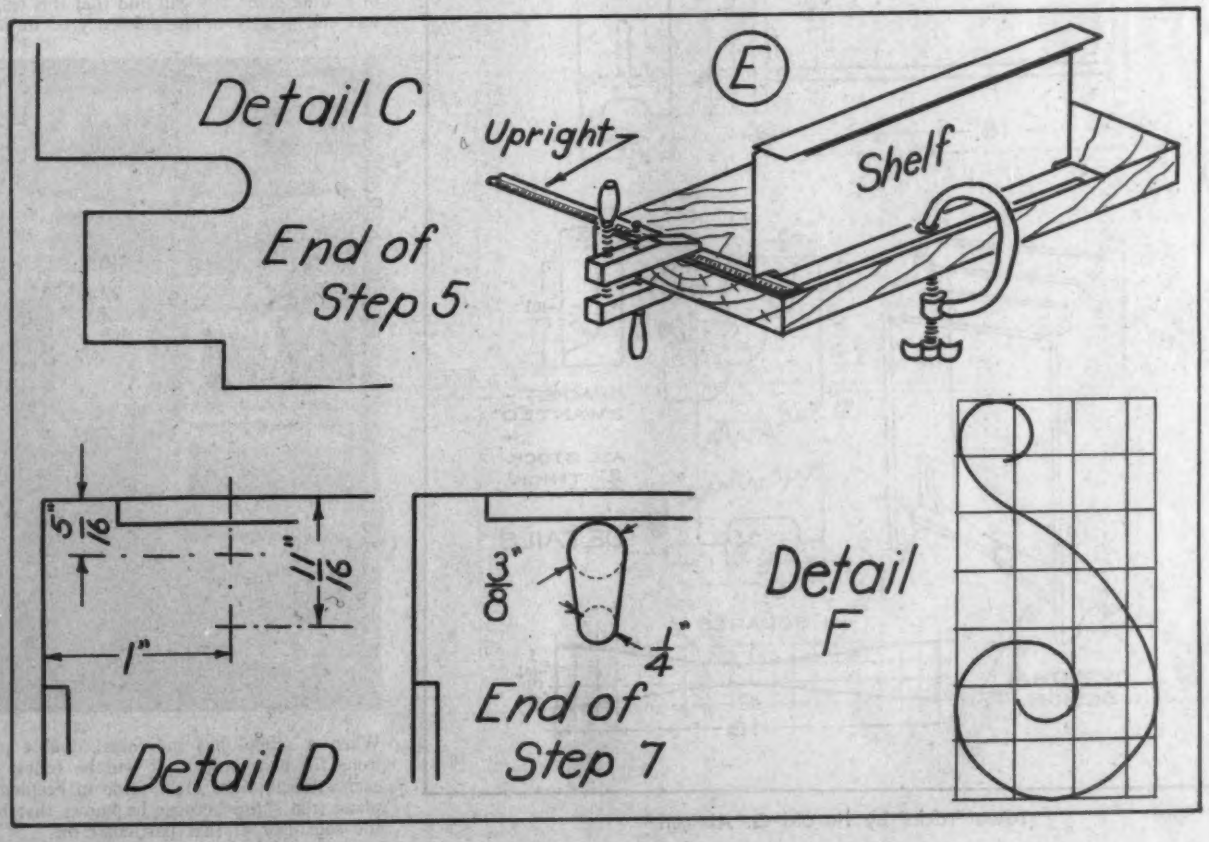
Stock: Three or four No. 10 cans, 2 wire coat hangers, or 1/16 by 4-in. strap iron.

Preliminary: Wash cans, remove bottoms, cut off seam and rims. Pass through slip rule to straighten.

Procedure:

1. Cut three pieces 6¼ by 10¼ in. Check carefully that all edges are smooth and straight, and that all corners are square. Study carefully the sample corners on display.
2. Lay out and cut corners on all pieces as per detail.
3. Have work checked by instructor. After the approval, number pieces 1, 2, and 3.
4. Lay out and drill an 8-in. hole as per detail *B* on shelves numbered 2 and 3.
5. With snips make two cuts ⅛ in. apart into hole. Result should be as shown at *C*.
6. On bar folder turn a ⅛-in. hem on extreme edges of all three pieces.
7. On shelf numbered one, lay out and drill two holes as per detail *D*. Large hole is ⅜ in., and the small one is 3/16 in. With cold chisel make two cuts tangent to edges of holes.
8. Set bar folder to 15/16 of an inch and bend long edges of all pieces at right angles (hems up).
9. Tin the inside end surfaces of front and rear aprons.
10. Cut four strips of tin can stock ⅝ by 13½ in.
11. Fold 1/3-in. hem on both edges of all four pieces.
12. Tin ends of uprights, two on the flat side and two on the hemmed side.


1/8"
1 1/8"
1/100"
1/2"
End of Step 2
Detail A
1/16"
1/8"
3/8"
End of Step 4
Detail B


Detail C
End of Step 5
E
Upright
Shelf
5/16"
11/16"
1"
Detail D
3/8"
1/4"
End of Step 7
Detail F

13. Using any board with squared edges and ends, clamp shelf No. 3 along the edge of board and one upright along end of board with the upright placed in the opening allowed for it. Study illustration *E*.

14. Sweat joint at corner.

15. Repeat similar operation on other three corners. Uprights should all face one way.

16. Solder uprights to shelf No. 1. Apron with key holes should face same direction as hems of uprights.

17. Solder shelf No. 2 6 in. below shelf No. 1.

18. Cut four strips of 1/16 by ¼ by 17 in., or straighten wire coat hangers and cut four pieces 17 in. long.

19. Form to pleasing scroll on jig or with bending forks. See detail *F*. Match the curve on the drawing.

20. Tighten or ease scroll so that it fits snugly in position between uprights and shelves.

21. Mark contact points and tin these spots. If wire is used flatten these spots over anvil horn before tinning.

22. Sweat scrolls in position.

23. Appraise workmanship and make corrections or improve details.

24. Paint.

TOWEL RACKS

HAROLD O. AKESON

High School

East Orange, N. J.

Because a towel rack must stand the constant dampness of wet towels, it is best made of maple or oak, if it is to be finished with spar varnish. A hard grade of white wood can be used if it is to be painted or enameled to match either a kitchen or bathroom.

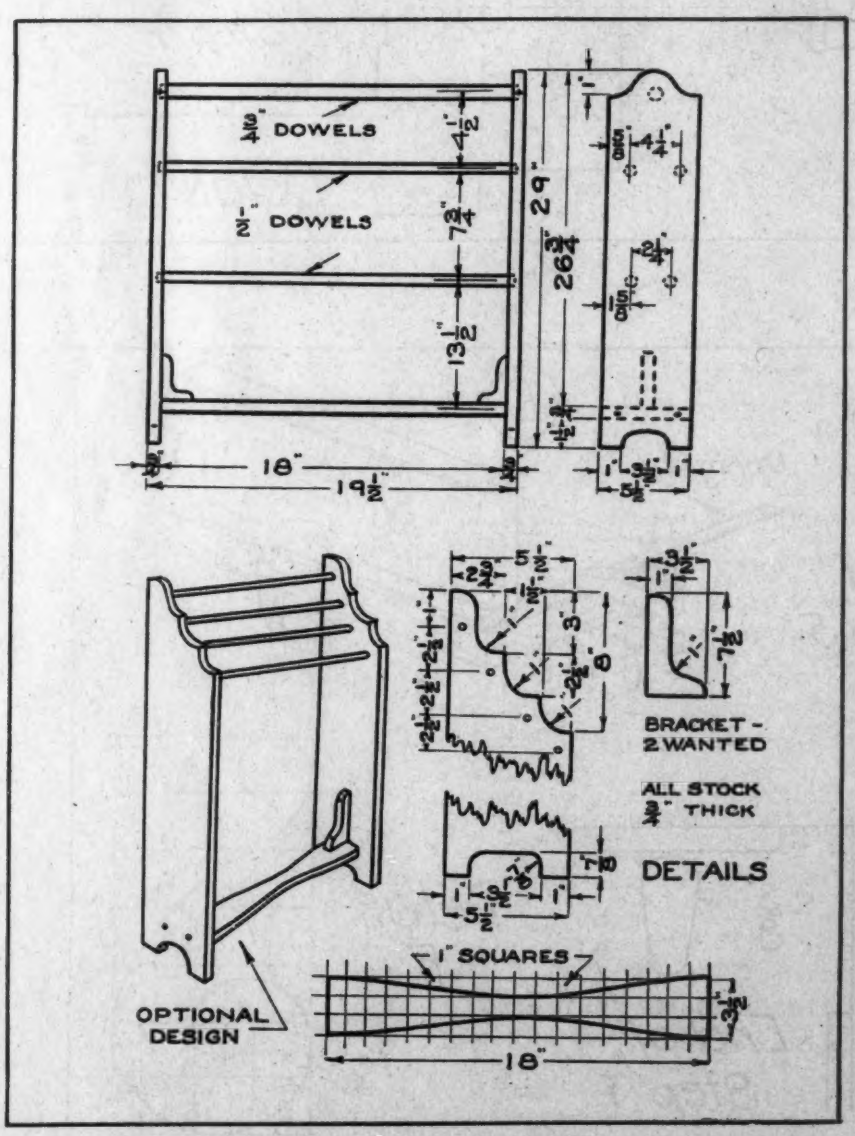
A convenient feature of this particular towel rack is that it can be moved from one place to another. This is especially handy in front of a radiator to dry quickly towels or other things hung upon it. Because it is narrow, it takes up very little space and may be placed in a closet when not in use.

When the kind of wood has been selected and milled to size, lay out the two side pieces, the bottom piece, and the stretcher. Hand plane each piece and mark locations for the dowels and screw holes. Cut shape or curves on the band saw. Bore holes for dowels only part way through the side pieces — deep enough to hold the dowel in place but not bored completely through the wood. Drill all screw holes. Cut dowels to right length. Lay out small brackets and cut to shape on the band saw.

Thoroughly sandpaper all parts with No. ½ and No. 1 sandpaper. All edges, especially the curves on the top and bottom of the end pieces, should be carefully smoothed with a file before sandpapering.

Assemble parts and insert the dowels in the holes bored for them. Attach each end with glue to the side pieces and then, with No. 8 by 1½-in. r.h.b. screws, fasten them securely in place. Brackets then are glued and fastened with No. 8 by 1½-in. r.h.b. screws to side and bottom pieces.

For a natural finish on hardwoods apply two coats of spar varnish. Rub down between coats with No. 2/0 sandpaper. If paint is to be used, apply one coat of flat paint and two coats of enamel (color as desired). In either case of finish, rub the last coat with pumice stone and water until smooth.



Towel racks by Harold O. Akeson

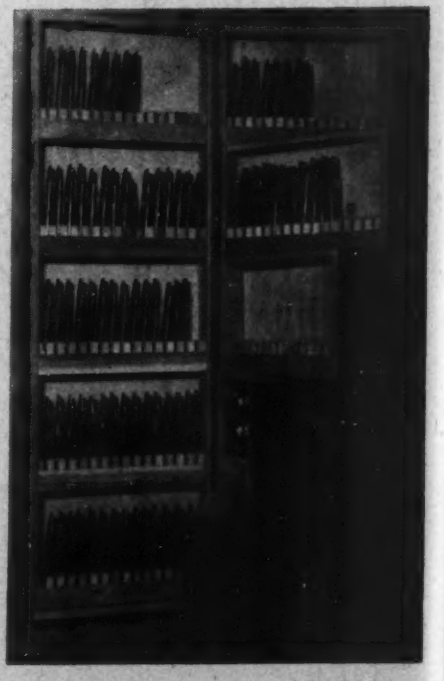
PLANE-BIT CABINET FOR THE WOODSHOP

DALE ROBERTS

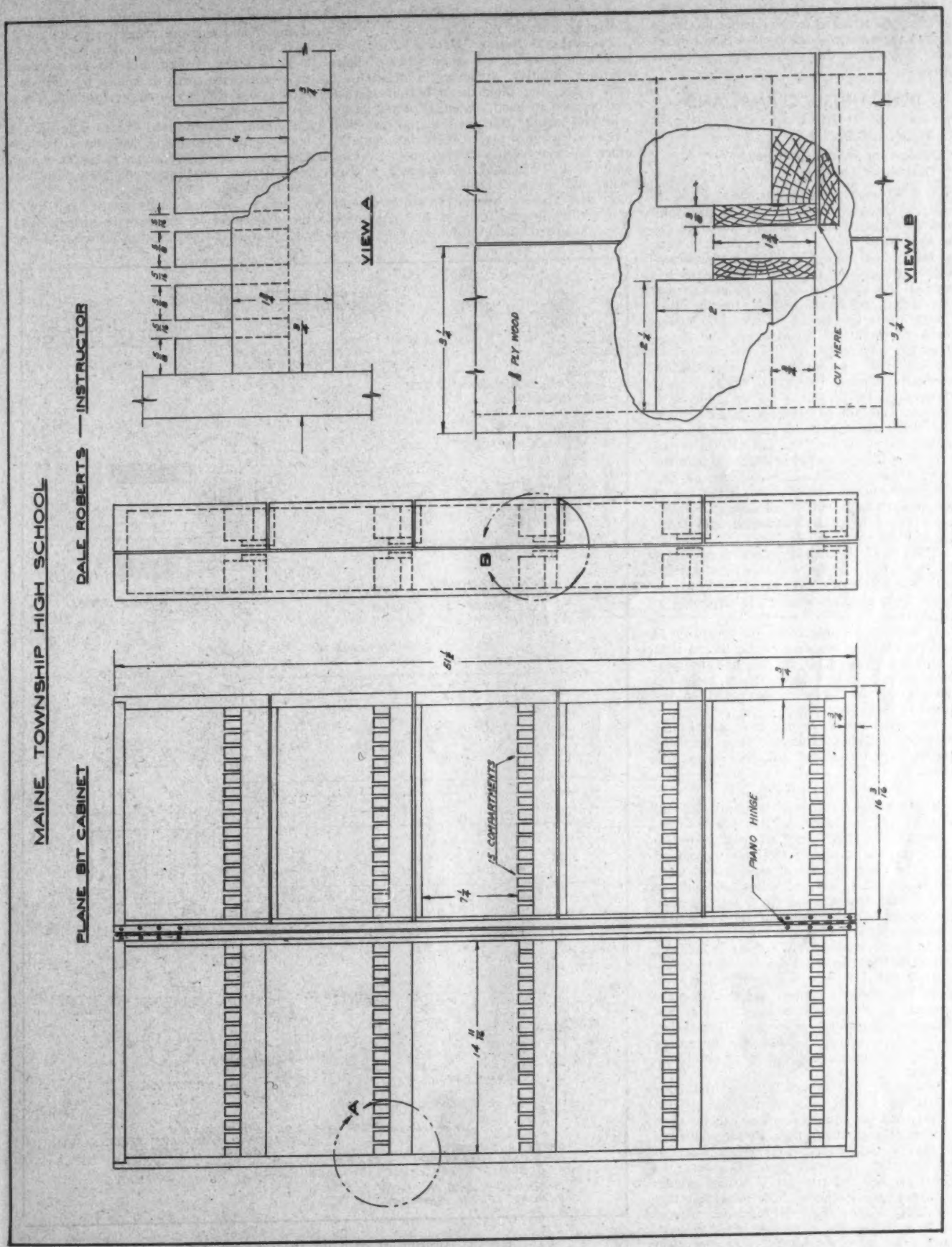
Maine Township High School

Des Plaines-Park Ridge, Ill.

Conservation of space in the shop is always a problem. Any school that has the problem of storing plane bits will find that this cabinet will add greatly to the efficiency of its shop.



When a school has individual double plane irons for each student it will be found that each student takes great pride in keeping his plane iron sharp because he knows that he is the sole user of that particular bit.



Plane-bit cabinet for the workshop

The number of compartments in the cabinet may be adjusted to the number of classes and to the number in each class. The cabinet can be hung on the wall in any convenient place.

BENCH VISE, CLAMP, AND DRILL JIG

G. H. SNADDON

Nolan Intermediate School
Detroit, Mich.

The all-steel vise shown herewith is an excellent project for teaching the principles and practices of machine-shop work. It can be used in the home workshop for such work as model boat, model airplane, model steam-engine work, and the like. Experience has proved that the method of procedure and the results obtained depend, among other things, upon the extent of the shop equipment. A variety of accurate machine operations are necessary for its completion. It can be made individually or by production methods. Related subjects lessons in shop theory can be presented on such topics as threads and thread cutting, including tap size drills and clearance drills; lead angles and their calculation; fits and fitting; laying out and drilling matched holes, taper pins and taper reamers, the making and use of drill jigs, including an explanation of the use of the tool maker's button method in locating holes to precision measurements; heat treating of steel, and the like.

The use of an auxiliary screw is necessary to straighten up the movable jaw parallel with the stationary jaw so as to keep the work from slipping when it is tightened in the vise.

It will in all probability be necessary to make a drill jig, square or acme thread taps, templates, form tools, and the like, to complete these vises as shown. These tools and devices are not likely to be found on the standard equipment list.

The making of these jigs, tools, and gauges provides valuable experience and furnishes excellent problems for advanced shop students.

The Drill Jig

The drill jig shown is of simple design and can be readily made in the school shop. Absolute precision is the essential factor or chief aim in machining this job throughout since the chief purpose of making and using jigs is to produce work accurately and quickly. Space will permit of only a brief general description and discussion of the method of procedure rather than a detailed outline for each piece involved. Whatever machining method or methods are used must be considered from the standpoint of which produces the closest accuracy, and the advanced student or apprentice must use his best judgment, previous experience, knowledge, and skill accordingly during the operations of locating, measuring, truing up, and machining.

Machining the Jig Body: For the body of the jig a solid piece of machine or cold rolled steel, or an iron casting, can be used. Machine the groove to approximate width and depth in the shaper, milling machine, or planer; then grind all surfaces, except the ends, parallel and true on a surface grinder with a magnetic chuck. It is important that the base of the groove be machined true so as to avoid errors in making measurements later. The sides should be at perfect right angles to the base and should form a snug sliding fit with no play allowance.

Toolmaker's Button Method Used: In locating and boring a hole or series of holes requiring positive accuracy in relation to each other, the toolmaker's button method can be used to good advantage. First locate, drill, and tap the hole for the stop pin; then screw same into place. Next lay out the other holes as accurately as possible within limits of .010 in., using center punch, scriber, scale, and dividers. Drill clean through the piece and tap each hole in the center of each of the three layouts for a ⅛-40 N.C. button screw. Standard buttons are made in sets, each of which contains four buttons of the same diameter and measure respectively .300, .400, .500, and 1 in. in diameter. For the 1-in. set a ¼-24 screw is used. Buttons are fastened to a steel base plate or holder by the same screws and washers used in fastening them to the work.

Locating Buttons into Place: File off the burrs caused by tapping, and screw the buttons into temporary position just tight enough so that they can be rapped lightly into final position later. Clamp the jig body to an accurately scraped angle plate, and place the angle plate on an accurate surface plate, and proceed to locate the buttons the cor-

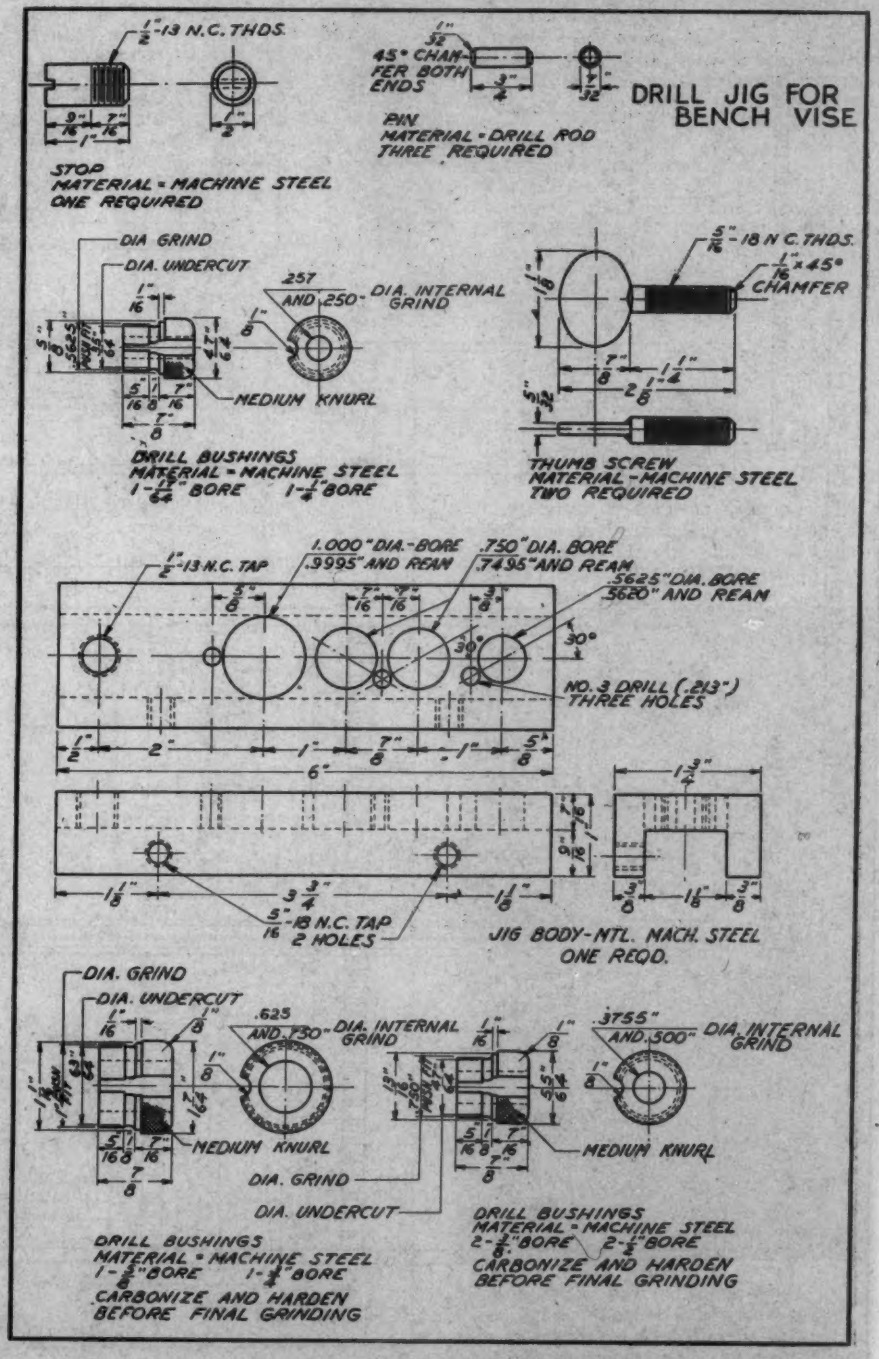
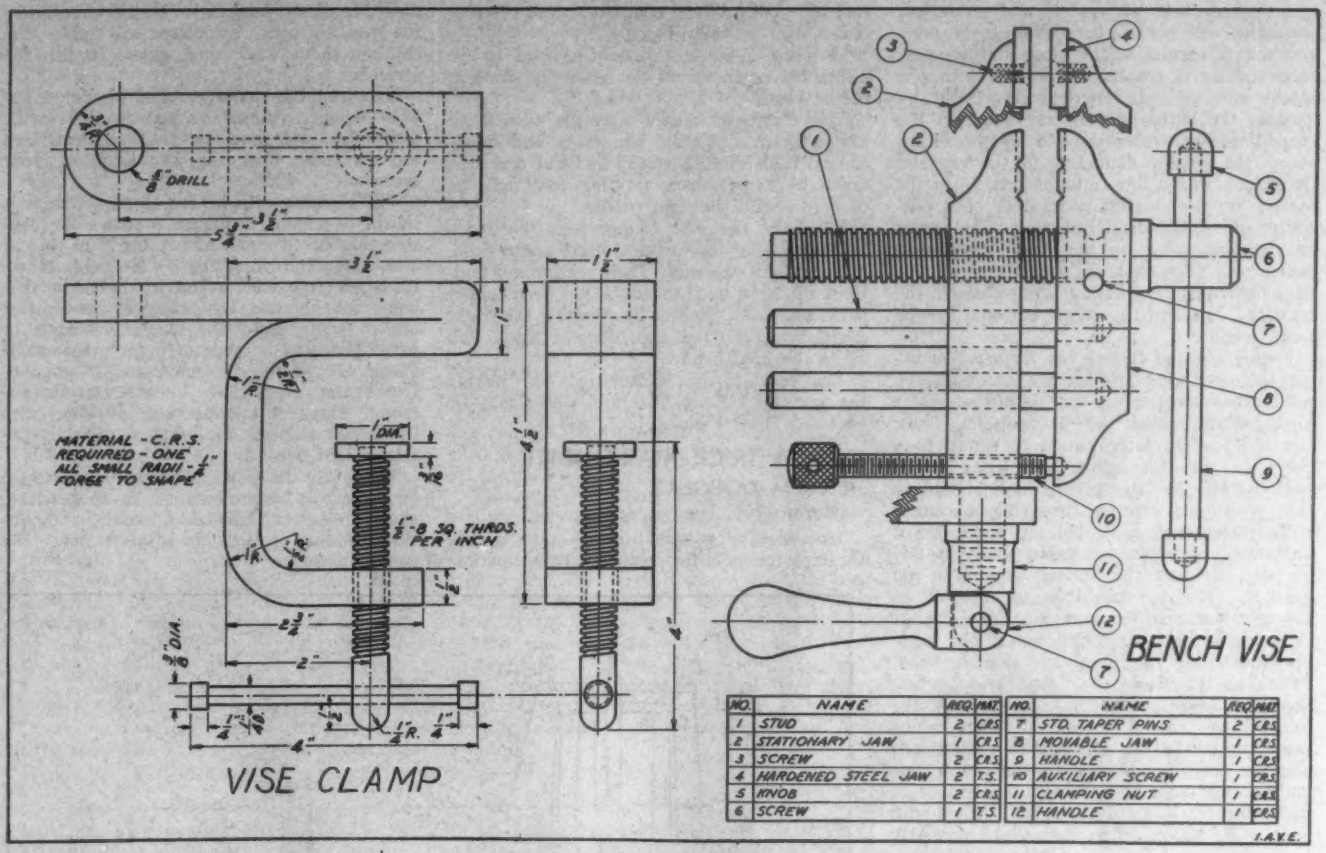


Fig. 3. Details of drill jig for making bench vise



NO.	NAME	REQ.	MAT.	NO.	NAME	REQ.	MAT.
1	STUD	2	C.R.S.	7	STD. TAPER PINS	2	C.R.S.
2	STATIONARY JAW	1	C.R.S.	8	MOVABLE JAW	1	C.R.S.
3	SCREW	2	C.R.S.	9	HANDLE	1	C.R.S.
4	HARDENED STEEL JAW	2	T.S.	10	AUXILIARY SCREW	1	C.R.S.
5	KNOB	2	C.R.S.	11	CLAMPING NUT	1	C.R.S.
6	SCREW	1	T.S.	12	HANDLE	1	C.R.S.

Fig. 1. Assembly of vise and clamp

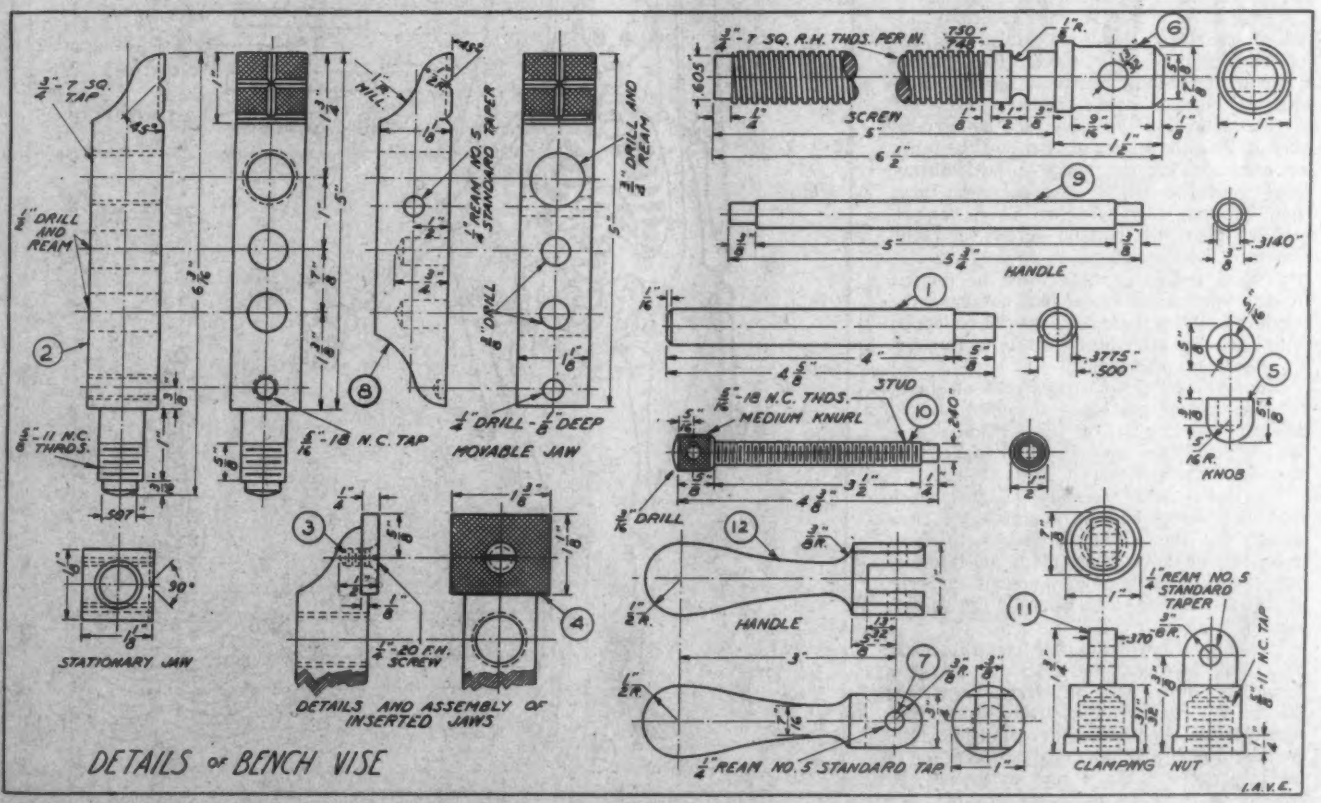


Fig. 2. Details of bench vise

rect distance between centers and in perfect alignment with each other. This can be done best with a vernier height gauge and micrometers reading in ten thousandths or with size blocks and accurate micrometers. Begin by locating the button nearest the stop pin the correct distance from the pin by measuring across the outside diameters of the pin and the button with a 3-in. micrometer. When the button has been correctly located, both centrally and longitudinally, tighten the center or clamping screw so that the button cannot move. Then recheck the setting as this final tightening may have slightly changed the location. Locate the other buttons in the same manner.

Truing Up and Boring the Holes: Following the operations of locating and screwing the buttons permanently and tightly into their final position, chuck the jig body in a four jaw independent lathe chuck or clamp to a perfectly true face plate and true up the button over the largest hole to be bored so that it is true with its axis and concentric with its center line. A dial test indicator or universal test indicator can be used for this purpose. Remove the button, then drill and bore the hole to size. Proceed to true up the next button in the same manner and after drilling and boring to size, repeat the same operations for the third and fourth holes. Providing the work has been carefully and skillfully done throughout, a checkup of the finished job should reveal the holes to be perfectly located in relation to each inside edge of the jib body or to the center line and to each other at least with a tolerance of not more than .0002 in. Vise jaws drilled with such a jig should align themselves perfectly and eradicate the assembling difficulties usually encountered when attempting to drill and match holes accurately to a layout.

Jig Bushings: The bushings should be accurately machined, hardened and ground before being fitted into place. The outside diameter of the bushings must be concentric with the bore or inside diameter. They are of the removable type, one set being used when drilling the stationary jaw and the other set when drilling the movable jaw. Fitting them over the round pins prevents them from turning when drilling. They can be held in place by binding screws and the rims may be knurled so as to get a better grip when removing them with the fingers. In case your school shop does not have the grinding facilities these bushings can be lapped to finished size after heat treating to counteract shrinking and warping.

Clamping Screws: Clamp screws of standard sizes can be purchased and used to hold the vise jaw in place in the jig while it is being drilled. They may also be designed and made in the school shop.

The detail and assembly of the bench vise, vise clamp, and jig are probably clear enough for the advanced student to work from, without having any additional information. The bill of material describes the type of material that is to be used for the various parts of the vise.

Probably a few additional remarks might be useful, however. For instance, the jaws should be draw filed all over. Then they are to be heat treated after which they should be polished with a fine abrasive cloth, or they should be grounded all over on a surface grinder. Then a spot finish may be applied to them by using a piece of ½-in hardwood dowel rod lubricated with a mixture of valve grinding compound, and rotated, like a drill, in a drill press.

If insert jaws are made they are to be assembled as shown in the assembly drawing of the vise.

The clamping handle may be turned to shape by manipulating the cross and longitudinal feeds simultaneously by hand, and then finish by filing; or a forming tool may be used to obtain the right profile.

To make the vise clamp, heat the stock to a red heat and make a right-angle bend, 5¾ in. from the end. Then reheat and continue the bend until the stock has been folded back on itself. Reheat and make the right angle bend for the gap. Reheat again and make the final bend.

The rest of the information for making the parts of the jig, vise, and clamp may be obtained from Figures 1, 2, and 3.

A TRICK MARIONETTE

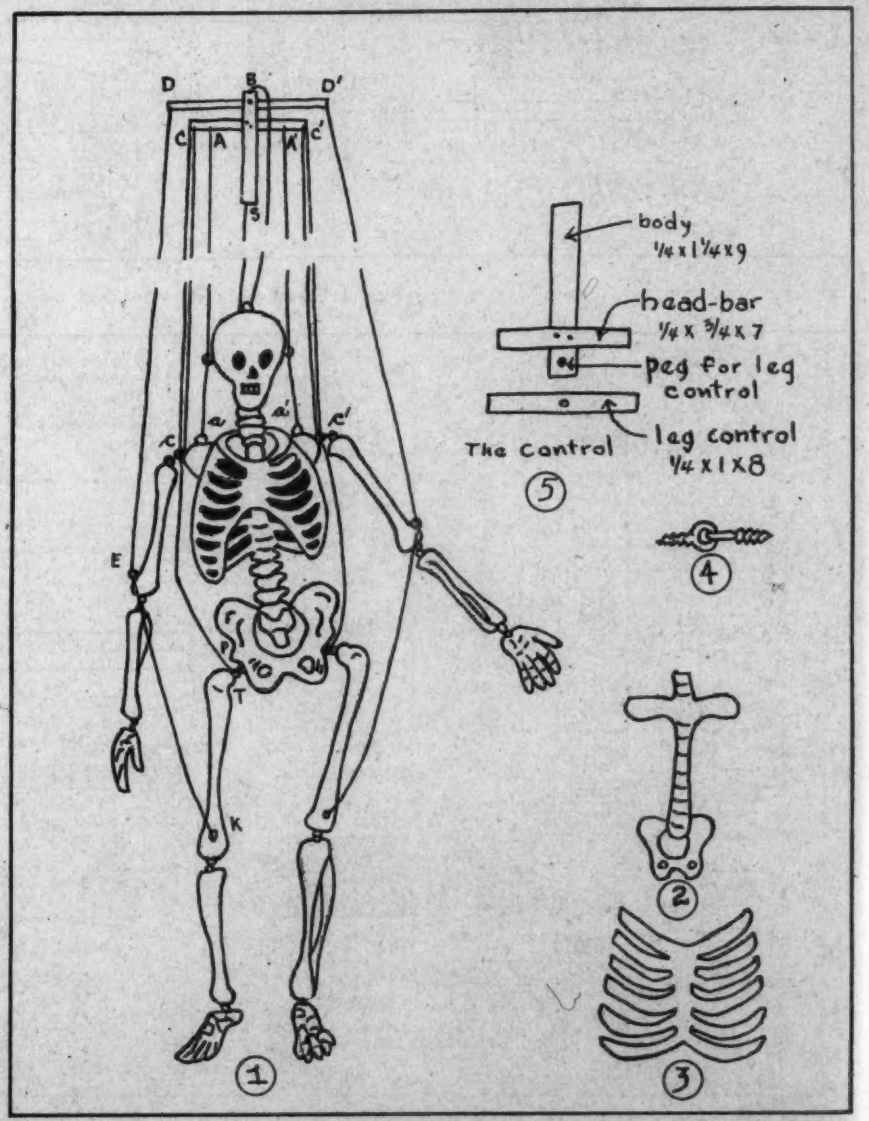
HELEN M. DOUGLAS
Commerce, Tex.

If you have a love for the stage, and a sneaking fondness for creating hilarious action, then Napoleon Bonaparte is the marionette for you to own. Napoleon will make the children shout while their elders furnish the screeches.

Napoleon Bonaparte is what his name implies — bones. Bones on strings that make him walk, dance, and lose his head, arms, and legs to come back together again at your command.

The skeleton with its ten magical strings is shown in Figure 1. Figure 2 shows the construction of the body. It is made of ¾- or 1-in. pine. The ribs (Fig. 3) are made of tin (a large can), and tacked to the body. The bones for the arms, legs, and feet are whittled out of white pine. The hands are made of wire. The head is made of pulp papier-mâché (page 420 of the December, 1937, issue of INDUSTRIAL ARTS AND VOCATIONAL EDUCATION). The feet can be made of wood with the bones painted on, or they can be constructed of wire.

When all the parts are made, give them two coats of white enamel to make them show up better. Use black paint to outline the shadows on the head, spine, feet, and pelvic bones.



A trick marionette

While the paint is drying, make a control like the one shown in Figure 5. Use white pine ¾ in. thick.

Join the arm bones at the elbows, the hands at the wrists, the leg bones at the knees, and the feet at the ankles with interlocking screw eyes. Use very small screw eyes on all marionettes. See Figure 4.

Put a screw eye in the top of the skull, one on each side of the head where the ears should be, one on top of each shoulder blade, one on each end of the shoulder blade for the arm to join, and one on each side of the pelvic bones where the legs join the body. Screw in an eye into the end of each upper arm and thigh, one at each knee on the thigh bone, one at each elbow on the upper arm, and one on the back side where the spine joins the pelvic bones.

Use black linen button and carpet thread, or black fishing line, to string this marionette. If Napoleon is 2 ft. tall, cut two 32-in. lengths of thread. Tie the end of one string to the head bar at A. Tie the second string at A^1. Run the end of thread A through the ear screw eye and tie to the skeleton's shoulder blade (a). Hold the control level to put on the second string. Tie a third string to the front end of the control body B. Take up the slack, and tie the other end of the screw eye in the top of the skull. By pulling this head string, the head leaves the body easily.

Cut a longer length of thread for the leg. Fasten securely to the top of the right leg (T). Run this string through the screw eye on the right side (P) of the pelvic bone, and on up through the eye (c) on the end of the right shoulder blade. Pull the string taut so that the leg joins the body in a natural standing position. Make it fast to the head bar at C. String the left leg in the same way.

Fasten a string to the screw eye in the top of the right arm; run it through the screw eye c; tighten the string; and tie to the head bar at C. Attach the left arm.

Hold the skeleton in a standing position with arms hanging at the side. Tie a length of thread to the screw eye K on the right knee. Extend this string to the right elbow and tie securely to eye E. Then fasten the string to point D on the leg control. Repeat this process for the left side.

The last string is tied to the screw eye on the spine. Hold the control level. Then fasten the back string to the control body at S. This string balances the marionette so that he may be made to walk normally. It makes it possible for the skeleton to make a bow at the end of his act.

To make Napoleon come apart, hold the control body in the left hand. Pull the head string with the left index finger to make the head come off. Hold the leg control in the right hand, moving it forward to make the arms and legs leave the body. Release the head string and return the leg control to normal position, and Napoleon is back together again. A little practice will suggest many possibilities for an enjoyable Halloween stunt for the school carnival. Yes, Napoleon Bonaparte lives again. Come and see for yourself.

A USEFUL WIRING PANEL

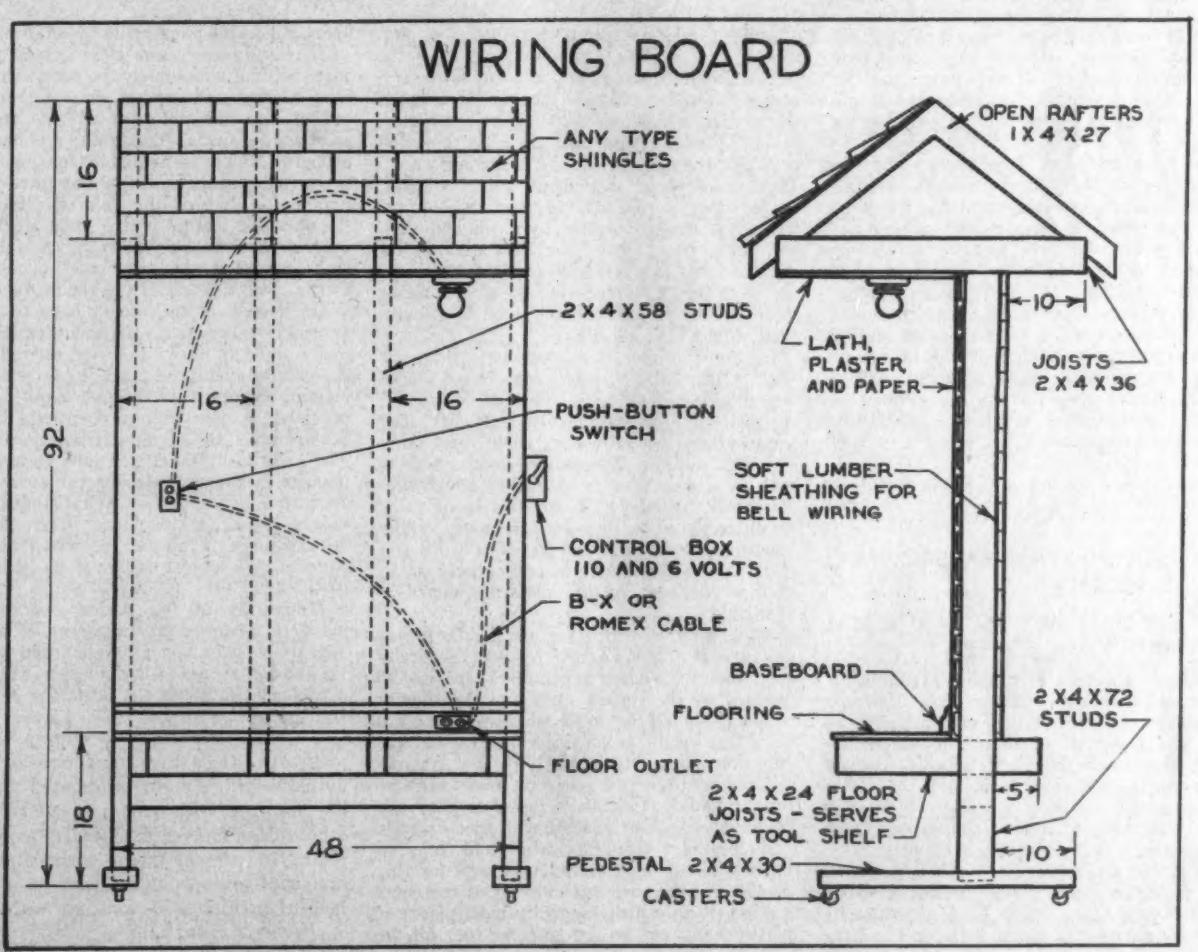
STANLEY J. DRAZEK
Formerly at the
High School, Liberty, N. Y.
Now with the U. S. Armed Forces

This electrical panel, built by a woodworking class, illustrates a section of house construction, provides an excellent surface for demonstrating paper hanging and painting, and last but not least, it serves as a fine, realistic wiring board which is an attractive addition to any shop and which can easily be rolled out of the way when not in use.

This panel, built entirely of scrap material, provided the woodworking class with practical house construction techniques, laying out, cutting and assembling studs, joists, rafters, nailing laths, plastering, paper hanging, laying flooring, fitting base molding, and numerous other jobs. It took but a few hours to construct the board by volunteers. The entire class profited from timely demonstrations given by members of the class or by the instructor.

Swivel casters make it very easy to move, and students can work at house wiring on one side while others are doing bell wiring on the other side. Some of the boards can be removed from the bell wiring side, offering a realistic situation for open, knob and tube, wiring.

Students soon appreciate the need for clean,



accurate, and neat work when installing a plug, switch, or ceiling light. Too frequently schools fail to emphasize neatness, and when youngsters do repair jobs at home, they leave fingerprints, scratches, and other marks which always reveal the work of a novice. With a true-to-life wiring situation as this board provides, the instructor can also grade for neatness.

From time to time repairs must be made on the board, but this will afford an excellent opportunity to demonstrate repairing plaster walls and paper hanging.

NONFERROUS METALS IN THE WORLD OF TOMORROW*

DR. C. H. MATHEWSON**

A Summary

In 1885, the ratio of iron and its alloys compared to the nonferrous metals such as copper, lead and zinc, produced in the same period was twenty to one. In the year 1941 this ratio had been reduced to 13.8 to 1 and accurate figures as to how much less than that it is now will not be available until after the war.

There is an unmistakable tendency to use more nonferrous metals. The war has stimulated the production of two of these, aluminum and magnesium, and these two will enjoy greatly increased use in civilian goods after the war.

No great host of new alloys has been discovered during the war. In 1936 there were 8000 already listed. Probably only minor variations have been made since. The compositions of some have been changed to conserve strategic materials. Others have undergone quick evaluation in a few years, as for example, the substitution of silica and aluminum bronzes and beryllium copper for tin bronzes.

Enormous advances have been made in casting, fabrication, heat-treating, welding, and mechanized precision control. These include such things as centrifugal casting and the old wax investment method of casting, first used by dentists in casting inlays.

There are about 20 relatively rare metals such as platinum, osmium, thallium, titanium, and thorium whose use will be further investigated after the war. One of these, indium, whose annual production is about half a million ounces has already been found to improve greatly the resistance of bearing alloys to oil corrosion.

*Address given at the Boston University Institute on Postwar Problems.

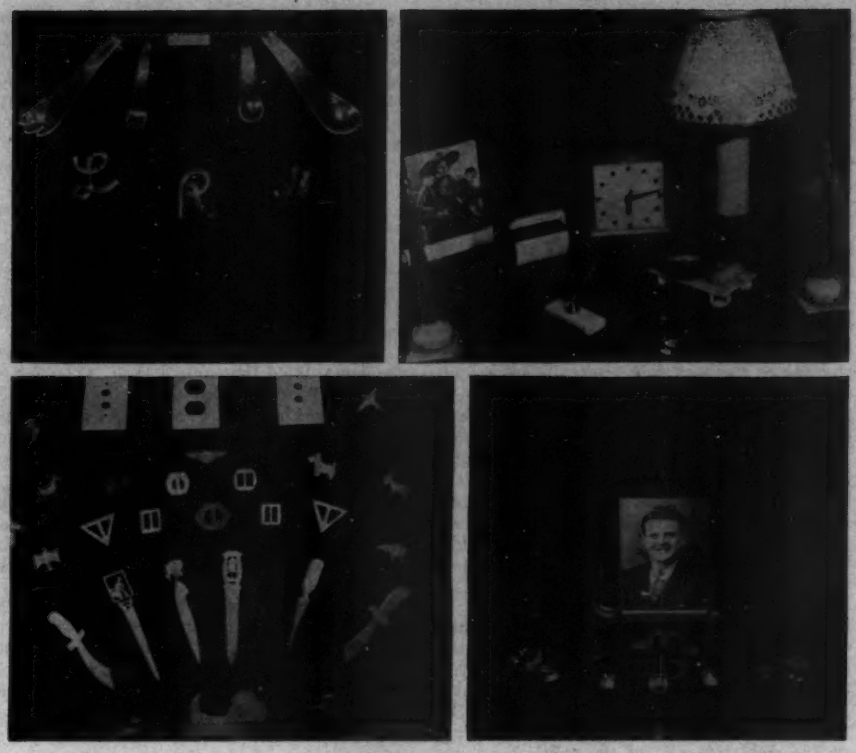
**Yale University, New Haven, Conn.

PLASTICS IN THE CLASSROOM

JOHN E. ROBERTS

Kelly High School
Chicago, Ill.

With the shortage of supplies available for the school shop many teachers are beginning to realize the possibilities of plastics as a substitute material. Judging from the enthusiasm with which this craft is being received there is all indication to believe that after the war it will remain a part of the industrial-arts curriculum wherever it has once been inaugurated. The possibilities of plastics in the near future are endless and it promises to be one of our major industries when wartime production ceases. Projects are easily made by students with but little skill and the finished products are both attractive and useful.



Examples of use of plastics in the school shop

The simplest type of equipment is necessary because ordinary hand tools will usually suffice. The woodshop can very easily be used for work with plastic and possibly the only addition necessary would be a buffing wheel. Improvements in equipment can be made as the need arises and the teacher will find that such simple devices as a sanding disk will more than repay the effort used in its construction. The plexiglas pendant shown in the picture was formed entirely on a sanding disk and in about half the time it usually took with a saw and file.

Cast resins for the school shop are easily obtainable. Plastic fabricators have large quantities of scrap in a variety of colors and shapes which are suitable for craftwork. The smaller scrap generally costs about forty cents a pound and can be used for small projects such as pins or buckles. A good method is to start the students with one or two of these small items, since they embody most of the operations used on larger pieces of work and if the finished product is not entirely satisfactory the cost of the material wasted is negligible.

The larger pieces of scrap are slightly higher per pound. Pieces about 5 by 8 in. generally cost about 80 cents a pound. There is less wastage on the square stock and the thinner material should be used whenever practical since the weight is considerably less and the cost proportionately lower.

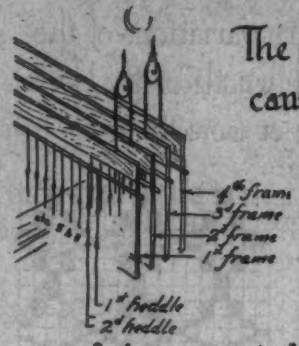
Be sure to get a generous assortment of rods, cylinders, and tube scrap also. They can be used in making bracelets, cigarette boxes, and the like. One fabricator sold rejected lipstick cases which served very well for ring blanks and the cost was only about ten cents a gross. With a little ingenuity most pieces of plastic scrap can be put to some use. All the items illustrated were made of scrap pieces.

In recent months the clear acrylic plastics have become exceedingly popular. The sparkling clarity and crystal clear transparency of this new material adds to its charm. The colorless projects illustrated are made of plexiglas which is available for educational use in unlimited quantities. The price is comparable to that of the colored plastics but the only bad feature is that sheet stock is the only type available. Plexiglas is fabricated with less effort than the cast phenolics and this is especially true in the bending operation. When heated in an ordinary oven to 250 degrees F. it becomes soft and pliable and is easily molded into most any desired shape. A significant feature is that it can be reheated indefinitely until the desired shape has been obtained. It can be formed entirely by hand or with the aid of wooden or plaster dies. The colorless plastics are now tremendously popular as women's ornamental wear and for decorative household use. What student would not be proud to take home an article which he has made in plastic for which he would have to pay several dollars if he had bought it.

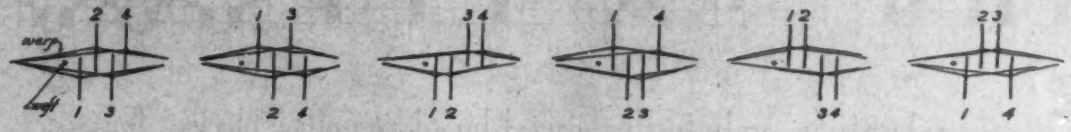
Motivation of the student working with plastic is no problem whatsoever. It seems to appeal to boys and girls alike and technical skill or age makes little difference. It presents a challenge for both the beginning craftsman and the advanced student.

". . . It is my conviction that subnormals will remain segregated but that low normals will remain scattered in our other classes. We shall learn to identify them, to present them with appropriate activities and problems, and to maintain helpful attitudes in working with them." — *Homer J. Smith.*

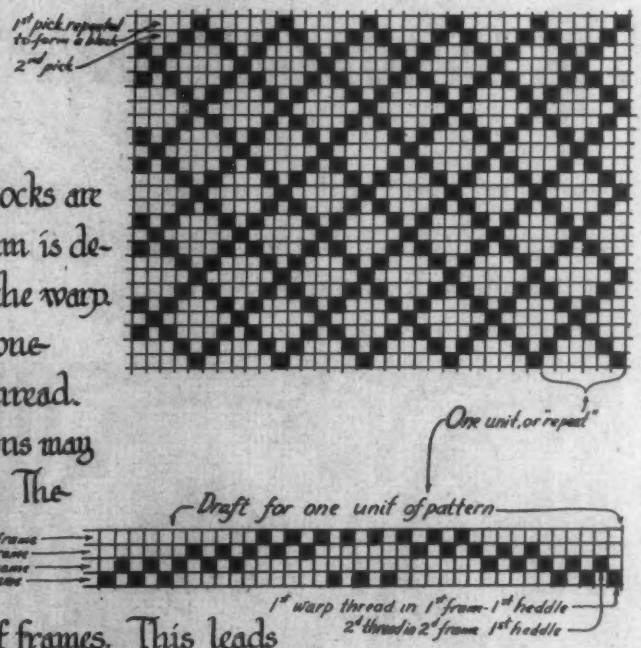
HOW IS PATTERN WEAVING DESIGNED?



The structural basis of pattern weaving is the process of causing a weft thread to lie across two or more warp threads. (This may be reversed to bring warp to the surface.) Since this overshot type of weaving is very frequently used on the four harness loom, a design is shown as developed for that loom.



The above diagrams show that there are six possible combinations of four frames (worked in pairs): 1-3, 2-4, 1-2, 2-3, 3-4, and 1-4. The first two, used alternately, produce a simple over-and-under cloth. The remaining four combinations form the pattern blocks. Hence it becomes evident that only four different lines (or "picks") of weft may be used in a design.

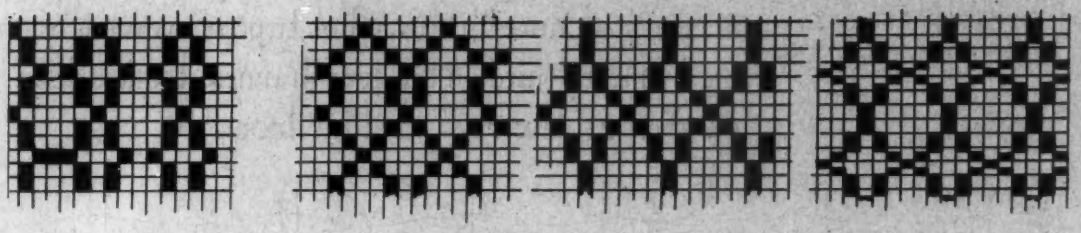

1st pick repeated to form a block
2nd pick
One unit, or "repeat"
Draft for one unit of pattern
4th frame
3d frame
2d frame
1st frame
1st warp thread in 1st frame-1st heddle
2d thread in 2d frame 1st heddle

The designer uses squared paper on which the pattern blocks are laid out. In this simple diamond pattern all blocks are of equal size. From this diagram is developed the draft for drawing in the warp. Each horizontal row represents one frame, and each block a warp thread. Any one of the four combinations may be used for the first pattern block. The second block begins with the last thread of the first block, and uses the next pair of frames. This leads to the third, and if, in turn, to the fourth. Thus, all four combinations are used, and may be repeated as many times as necessary.

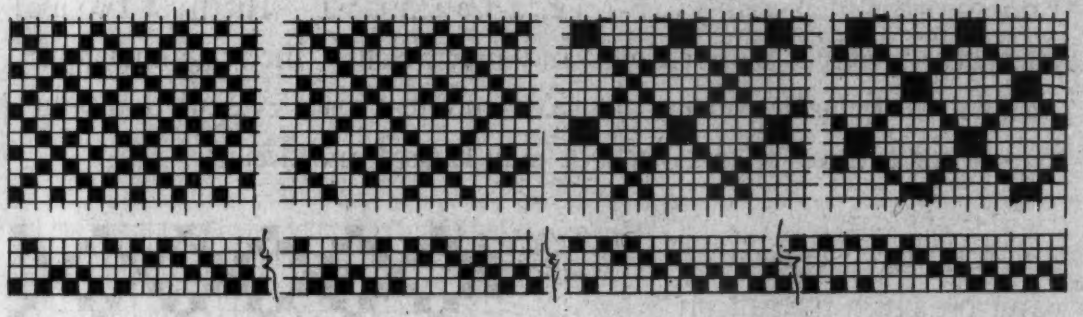
Plate 42. Design course by Burl N. Osburn, director of industrial arts, State Teachers College, Millersville, Pa.

PATTERN WEAVE (Continued)

The draft illustrated before can be used as the basis for pattern variations of the diamond form. The same warp is used, but the order and length of the blocks are changed. Additional changes come with the use of two or more colors.



The diamond pattern can be further varied by adding other blocks. These changes call for different drafts.



Below are two of the innumerable traditional patterns with a portion of the draft of each. The weaving designer frequently starts with one of these and develops a variation of his own.

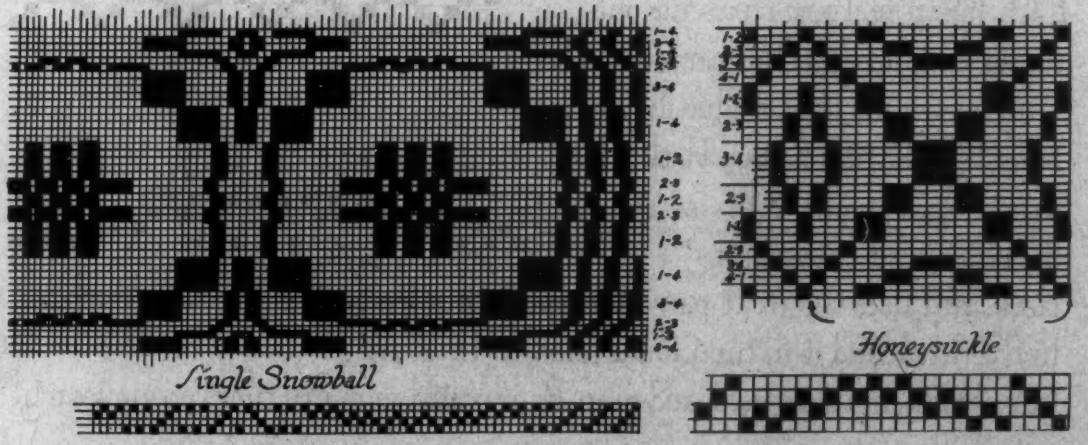
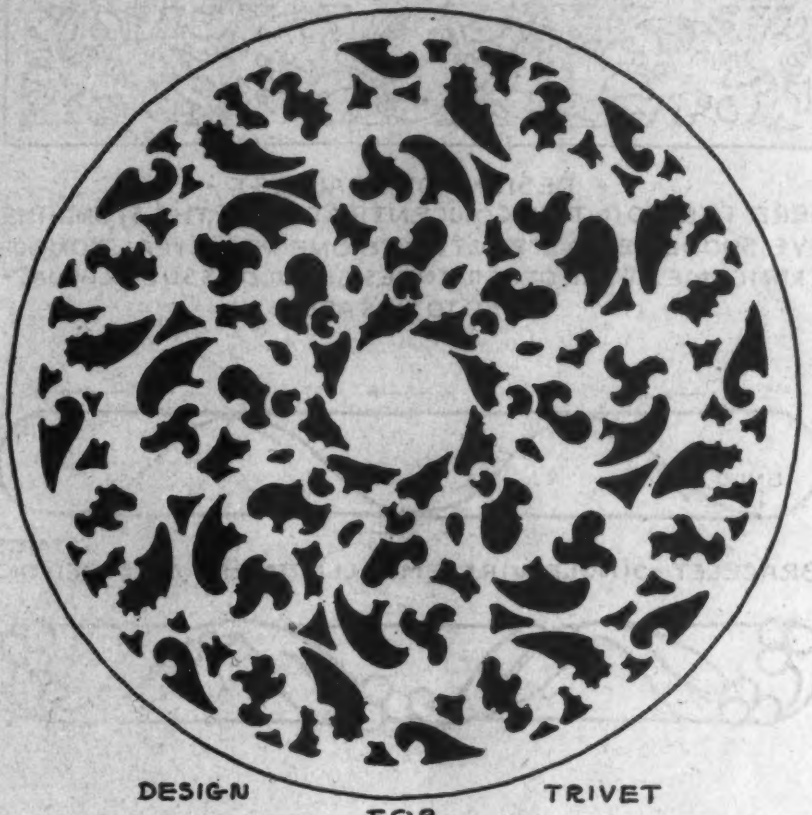


Plate 43. Continuation of design course by Burl N. Osburn, director of industrial arts, State Teachers College, Millersville, Pa.

PLATE 24 APPLICATION NATURE

IT IS MOST IMPORTANT
THAT THE STUDENT CRAFTSMAN AS WELL AS THE DESIGNER KEEPS IN
MIND THE LAW OF GROWTH. OTHERWISE MUCH OF THE BEAUTY IS LOST . . .
THIS SHOWS THE SKELETON FORM FROM WHICH THE DESIGN GREW.



DESIGN FOR TRIVET

ACCEPT ANY PROBLEM AS A CHALLENGE TO YOUR ABILITY. USE THESE STEPS IN SOLVING THE PROBLEM . . THINK. HAVE A CLEAR CONCISE KNOWLEDGE OF WHAT THE PROBLEM IS . . . COLLECT INFORMATION TO AID YOU IN THE SOLVING . . APPLY SELF CRITICISM IN THE VARIOUS STEPS OF SOLUTION . . COMPLETE THE PROBLEM

Plate 24. Continuation of creative design course by Richard E. Bailey, chairman, art department, Central High School, Providence, R. I.

THE SKELETON FORM

• DESIGN FOR BRACELET •
HERE THE POINT OF CONCENTRATION IS THE STONE·THE EYE SHOULD BE ATTRACTED TO ONE PRINCIPAL ZONE OF ENRICHMENT·ALL OTHER ZONES SHOULD BE SUBORDINATED TO THIS AREA

BRACELET··SINGLE WIRE·EMBELLISHMENT SOLDERED ON

THE SMALL DESIGN SPOTS ARE FOR RINGS

Plate 25. Continuation of creative design course by Richard E. Bailey, chairman, art department, Central High School, Providence, R. I.

APPLYING PNEUMATIC TIRES TO FARM MACHINERY

SEWARD H. FOOTE, ASST. PROF.
Virginia Polytechnic Institute
Department of Agricultural Engineering
Blacksburg, Va.

It will come as a bit of good news to many shop teachers that there is a method of converting steel tired farm machines to rubber that is efficient in operation, easy of installation, and by the use of obsolete tires does not interfere with the demands of tire rationing.

The illustrations show how this method was applied in putting rubber tires on a mowing machine.

For this project you will need an artillery type rear wheel of the same diameter as the mower wheel which you wish to replace. Remove the steel hub from the center of this wheel, measure the brake drum diameter, and compute the radius.

Jack up the mower so both wheels rotate freely. With a piece of chalk attached to a string which is the length of the radius of the brake drum, mark the spokes of the mower wheel for cutting. This can best be done by holding the free end of the string on the center of the end of the axle and rotating the wheel against the chalk held in the other hand.

Remove the mower wheel and reduce the diameter to that of the brake drum diameter by cutting off the spokes at the proper distance from center as marked.

Fig. 1. Cutting off the arms

Place the mower hub in the lathe and turn down to the same diameter as the original car hub.

Replace the car hub by the cut down mower hub in the wheel, and weld the ends of the spokes to the brake drum.

Fig. 2. Turning the arms to fit into the brake drum

One of the objections to the method of welding drop center rims to spokes is the difficulty of centering the hub on some installations. The above method is self-centering and, in addition, uses much less welding rod.

Fig. 3. The spider welded in place

By installing pneumatic tires, the life of the mower is increased, the traction under most conditions is improved, and operation is made more comfortable for the operator. By packing the car hub caps with grease an adequate lubrication for an entire season of work is secured. The wheels used on the project described were equipped with 33 by 4½-in. high pressure tires, so in order to provide maximum cushioning effect with no tire slippage on the rims they are inflated to 15 lb. only. This pressure will vary with the weight of mower and operator, but is about right for this installation which is for a 200-lb. man operating a Deering 6-ft. cut mower.

2½ METER WALKIE TALKIE

C. IRVIN METZGER
High School
Altoona, Pa.

This article has been submitted, together with complete data in detail, that those who might be interested in acquainting their pre-induction students with ultra high frequency radio communication gear may apply this in their shops. Of course, it must be understood that the F.C.C. requires a license for its actual operation.

This layout was originally planned to provide a useful work project for senior class students in radio and electronics classes in the vocational department of the senior high school in our city, and after being constructed they could be loaned to the city of Altoona for WERS work, whose station call for WERS is WKYU.

The War Emergency Radio Service is a temporary wartime communication service to aid in the protection of civilian life and property in the event of an enemy air attack or other emergencies that might arise. With the overloading or complete failure of the normal telephone circuits, a WERS unit provides emergency radio channels between the C.D.C.'s control centers, air-raid warden posts, police force, hospitals, and other vital points.

Station licenses are granted by the Federal Communications Commission to local city governments, towns, or counties. Also, this WERS is extended to state guards and civil air patrol. The WERS makes use mostly of equipment supplied by amateur radio operators. This service has been built largely on existing American Radio Relay League Emergency Reserve Corps. Further information regarding WERS may be obtained from American Radio Relay League Headquarters, Hartford, Conn., or direct from the Federal Communications Commission, Washington, D. C.

Figure 1 shows the finished unit. The details and diagrams on Figure 2 are self-explanatory.

The entire unit was constructed in our vocational shops by senior students. The steel cabinet was built in the sheet-metal shop from 18-gauge sheet iron bent to shape from one piece of metal, then put together by welding and with self-threading screws. A coat of wrinkle finish paint was applied to provide a finished appearance. The panel and chassis shelf were made from scraps of aluminum sheet, ranging in size from ⅛ to 1/16 in. in thickness, which were on hand. Iron or steel will also serve the purpose. The drawing was enlarged to actual size of the unit and used as a template for the panel and chassis. The cabinet has approximately ⅞ of the right side removable for the replacement of batteries and tubes. The battery compartment will house two 3-volt Burgess 4F2H batteries and four type 5308 Burgess B batteries. Normally, 135 volts of B voltage is sufficient, but 180 volts will increase the output somewhat.

The circuit is the conventional ultra-audion plate modulated oscillator and super-regenerative detector. The tubes used are 6J5 oscillator detector plate modulated by a 6G6 power pentode. If these particular types are not available, other types can be substituted. All that is necessary is that they have characteristics similar to those mentioned.

Most parts are obtainable, and even though substitutions and deviation in value of resistors and condensers might have to be resorted to, not too much sacrifice in performance will be experienced. If polysrene insulation for making the variable condenser support is unobtainable, bakelite may be used.

(Continued on pages 348 and 29A)

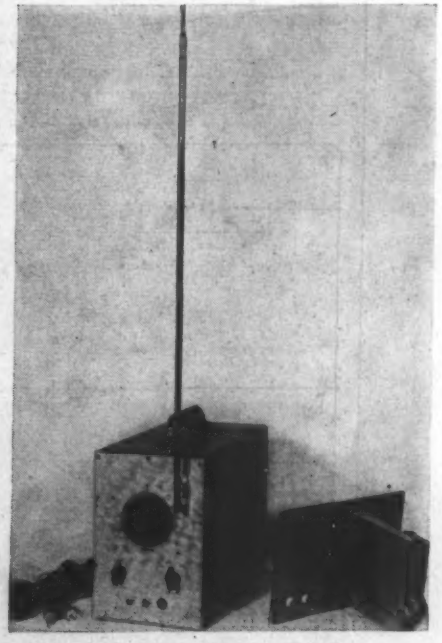


Fig. 1. The 2½ meter walkie talkie

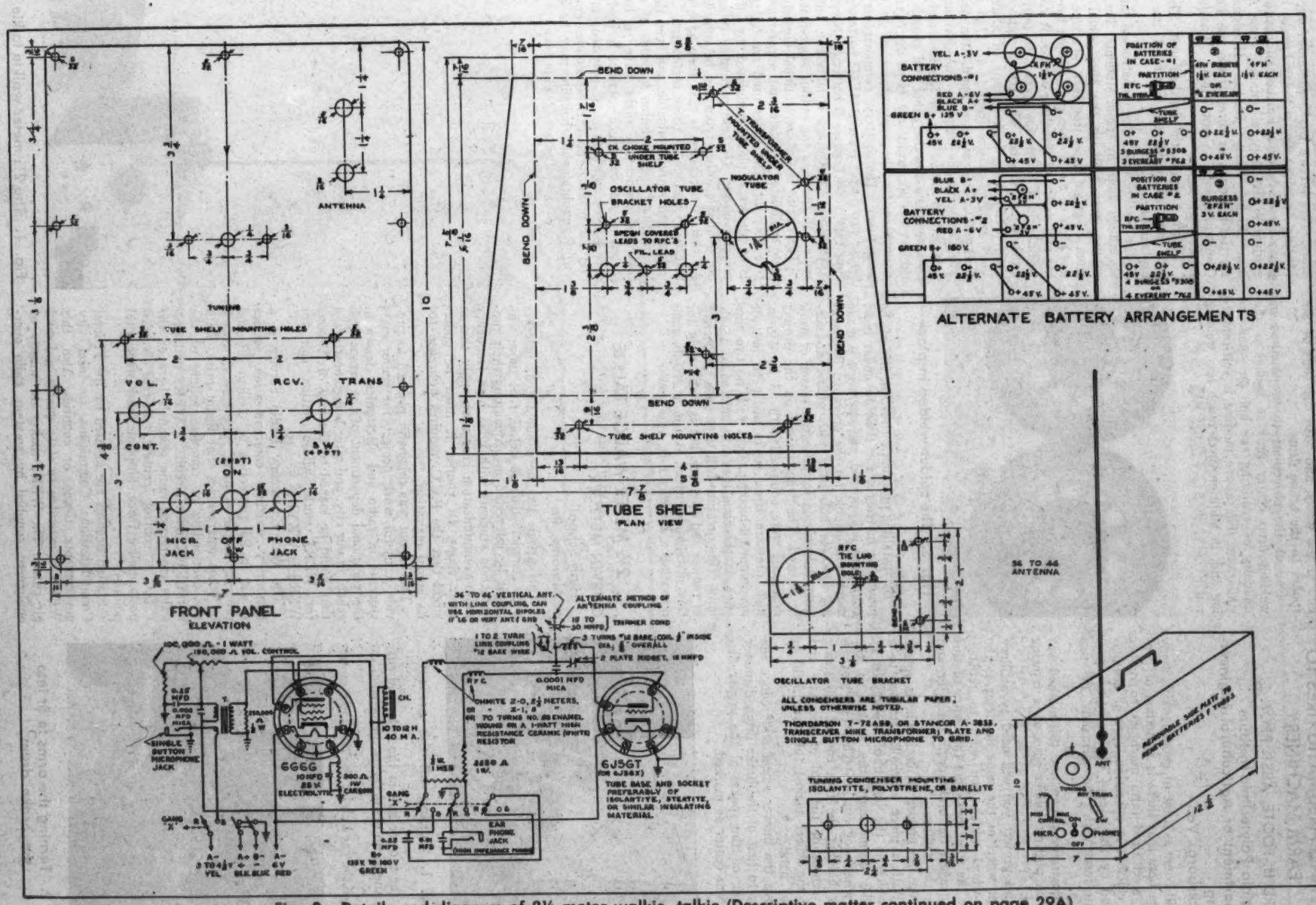


Fig. 2. Details and diagram of 2½ meter walkie talkie (Descriptive matter continued on page 29A)

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Legislation for federal-financed education of war veterans . . . desire for further vocational training by present-day war workers who want to maintain their post-war incomes at today's high levels . . . return of students for completion of war-interrupted schooling — these are factors that call for careful consideration of your post-war school shop program. Let Delta help you make the most of this golden opportunity to reflect credit on your profession.

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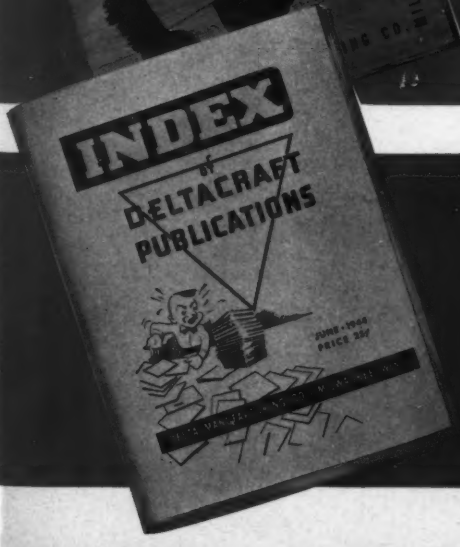

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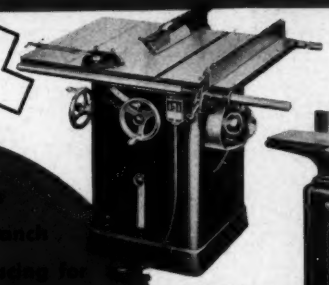
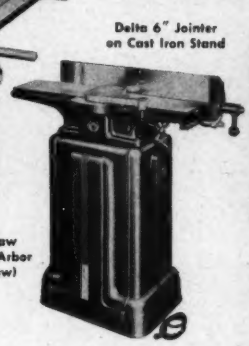
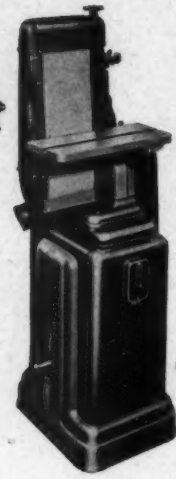
Certain tools are available to schools under *automatic* priorities (CMP Regulation 5a). **Consult Your Delta Distributor**

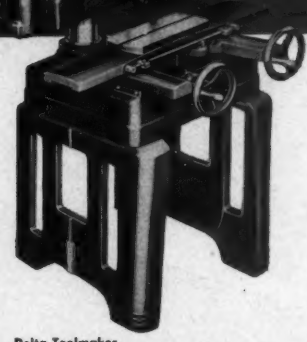


Delta Unisaw (10" Tilting Arbor Circular Saw)



Delta 6" Jointer on Cast Iron Stand





Delta Toolmaker Surface Grinder

Delta Abrasive Belt Finishing Machine

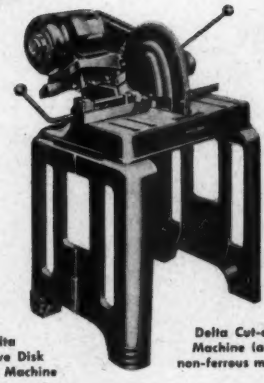
Delta Heavy-Duty Shaper

Delta 4-speed Scroll Saw

Delta 12" Woodworking Lathe

Delta 14" Band Saw (wood-cutting or metal-cutting

Delta Abrasive Disk Finishing Machine



Delta Cut-off Machine (also non-ferrous model)

Delta Industrial Grinder with safety shields

Delta 17" Drill Press (for metal, wood, or plastics)

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DELTA
MILWAUKEE
Power Tools

(Continued from page 348)

Likewise, if the condenser and tube socket with high frequency insulation is not to be had, bakelite will work. Since the exact value of capacity of the midget variable condenser might be hard to get, as in our case, we used any larger capacity, sawing off or removing all but one stator and one rotor plate. This will give about the correct capacity necessary to come within the 112 megacycle band. If not, the tank coil can be pulled apart or squeezed together to obtain the desired results.

The variable condenser support is fastened to the rear of the front panel by means of two 8-32 by 1½-in. machine screws. These screws pass through ¼-in. copper pipe distance pieces 1¼ in. long, holding the condenser away from the rear of panel. The variable condenser shaft is coupled to a short bakelite shaft, carrying the tuning dial by means of a ¼ CRL shaft coupling. This insulated shaft is absolutely necessary to prevent hand capacity in tuning. The variable condenser is best mounted so the stator plates extend upward or in an upside down position. The tank coil is soldered directly to the terminal or lugs of the condenser. All leads must be kept as short as is physically possible for best results.

The antenna coupling may be either of two ways — vertical adjustable whip 48 in. long coupled to the grid end of the tank coil through a 14-30 mfd. padding condenser, or by a center fed dipole antenna using two 18-in. rods link coupled to the tank coil by a variable one turn link.

Another hard-to-get item is the SB microphone and plate to grid transformer. This was overcome by the rebuilding of old audio grid to plate transformers such as the type made by Pacent, and found in old Sparton and Zenith receivers, where lots of space exists between the windings and laminations. Over this old original winding one layer of No. 30 enamel covered magnet wire, approximately 80 turns, is evenly wound, serving as the microphone winding. Transformer lead connections may have to be reversed if an audio howl is produced. Telephone, microphone, and head phones may be used if the conventional hand set is not available. Regular French type telephone hand sets made by Universal Microphone Company are ideal for use with this unit.

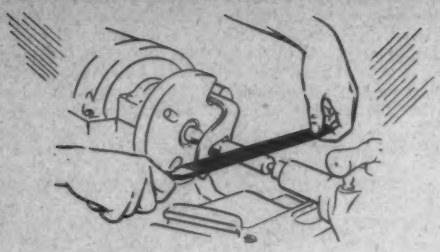
The rotary 4 pole 2 position switch used is a CRL 1450. If this is not available, two double pole, double throw, toggle switches with their levers arranged that they could be thrown simultaneously will do the trick. The RF chokes can be made by winding about 50 turns of No. 28 or 30 enamel magnet wire on the outside of an old type ceramic high value resistor, soldering the ends of the wire to the resistor end leads. A hard rubber or bakelite ¼-in. rod, long enough to accommodate the 50 turns of wire, having inserted at each end through a hole drilled in the rod a wire acting as a lead which is self-supporting and which provides a connection for the wires as well, makes a good substitute.

In this project, our prime motive was to stimulate a special interest in our classes of preinduction students by providing a simple work project demonstrating the fundamental principles in the field of ultra high frequencies.

Those interested and wishing further information on the construction of ultra high frequency gear will find many articles published in issues of *QST Magazine*, the official publication of the American Radio Relay League, West Hartford, Conn., and the *Radio Amateur's Handbook*, one of their yearly publications.

The students who hold the proper qualifications help in our local WKYU network drills and are very much interested because they can actually see the results of their own handiwork.

Filing Hints To Meet Your Needs



Lathe Filing

Widely used in industry for fitting and finishing shafts, lathe filing is an operation in which the file is stroked against the work while it revolves in a lathe. Lathe filing is commonly employed to correct the slight taper that sometimes results where the lathe cutting tool has been improperly ground or set for the wrong lathe speed or feed.

First,—select a Mill File. Or, if available, use a Long Angle Lathe File. Hold the file at a slight angle as shown in the illustration—with the work revolving towards the operator. Use a long forward steady stroke, moving laterally about half the width of the file on each stroke.

Beginners should be careful not to hold the file rigid or stationary, but to keep stroking continually.

NUCUT "Wavy Tooth" construction is a patented combination of coarse teeth and fine teeth that makes possible clean, deep, true cutting and also smooth finishing, both at the same stroke.

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America's Oldest File Manufacturers
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Personal News

♦ WILLIAM DOW BOUTWELL, chief of information of the U. S. Office of Education for 14 years, has resigned to take over the job of editing the Journal of the American Vocational Association.

♦ E. P. BULLARD, president of the Bullard Company, Bridgeport, Conn., and Col. ELMER HAVENS, president of Hunter and Havens, also at Bridgeport, were honored at ceremonies when the State Trade school was rededicated to become known as the Bullard-Havens Technical School. The part taken by Mr. Bullard and Col. Havens has been important in the growth of industrial education and has been responsible in making the technical school possible.

When the State Board of Education decided to upgrade the trade schools in Connecticut and put them on a level with schools of higher education, it was decided that persons closely connected with the development of these studies should be honored. Bridgeport is the first of six cities in the state which has had the program of its trade school changed to the level of college training.

(Continued on next page)

(Continued from previous page)

♦ H. V. STIRLING who for many years has acted as director of national rehabilitation at Washington, has been appointed by General Hines to be the director of rehabilitation and education, thus being in charge of the tremendous educational task of providing for the education of veterans under the G.I. Bill of Rights.

♦ R. W. E. BOWERS has been appointed assistant supervisor of trade and industrial education in the special field of industrial arts for the State of Louisiana. An expanded program in both vocational education and industrial arts will be undertaken in the twelve-grade system, on which schools will embark with the opening of the 1944–45 session.

For the past two years Mr. Bowers has been employed at Louisiana State University as an instructor in industrial arts. During this time he has acted as a special consultant to the State Department of Education in preinduction courses offered by the public schools.

Mr. Bowers' services will be available to various superintendents who wish to establish industrial-arts courses in the schools of their parishes or who wish to reorganize industrial-arts programs. Those school officials desiring his assistance may get in touch with Mr. Bowers through the State Department.

♦ ALDEN E. DINSMORE has been appointed printing instructor at High School East, Wichita, Kans., taking the place of Carl E. Bruner.

♦ RAYMOND P. ENSIGN, Syracuse, N. Y., was the winner of the Award of Honor of the Eastern Arts Association, at the Eastern Art Association's thirty-fourth annual convention luncheon in the Hotel Pennsylvania, New York City. The award is given annually for long and distinguished service in the field of art education.

♦ GILBERT C. FISHER, former photolith instructor, Ottmar Mergenthaler School of Printing, Baltimore, Md., has resigned to become associated with General Publicity Press of that city.

♦ PHILIP J. FRANK, printing instructor, Junior High School No. 172, New York City, is the new president of the New York Printing Teachers Guild, succeeding Joseph M. Howlin, The New York School of Printing, who served for two terms.

♦ JOHN E. FINTZ has been appointed assistant superintendent of the public schools of Cleveland, Ohio. Mr. Fintz formerly was the directing principal of Special Schools and Vocational Education of the Cleveland schools.

♦ WILLIAM GREEN, a graduate of the class of 1924 at Stout Institute, died recently. He was instructor of printing in the South High School, Pittsburgh, Pa.

♦ FRANCIS JOSEPH CHRIST, teacher of mechanical drawing in Tampa, Fla., died in a local hospital, at the age of 82. He had taught manual training and mechanical drawing in the Hillsborough High School for more than 37 years before retiring in 1941.

ARTHUR E. HARLEY RETIRES

Arthur E. Harley, founder of the department of printing of Central High School, Kansas City, Mo., and instructor in printing at the school for the past 24 years, retired on February 22, 1944, having reached the retirement age. Mr. Harley was a familiar and highly respected personality at practically all of the national conferences on printing education since the third annual conference held in Indianapolis in 1924.

He founded the printing department in 1920 and succeeded in developing a department that became the center of activity of the school and, most of all, influenced hundreds of students to better appreciate the use of the products of the art of printing and the practice of it in daily living.

One of the interesting publications launched by Mr. Harley, and which is affiliated with the National Student Graphic Arts Society, is the *Typographia*, the first issue of which appeared on October 27, 1922.

Mr. Harley's successor at the school is Alvin E. Limbaugh, who is a photographic technician and draftsman, besides being a biology and printing teacher.

When YOUR Boys Get On the Job

They can use Starrett precision measuring tools with the same confidence as these skilled machinists. Since student days, experienced craftsmen have placed their trust in the quality and precision of Starrett Tools — have been able to work swiftly, surely and accurately because the makers of Starrett Tools have steadfastly, and zealously maintained their high standards of accuracy and dependability through war and peace.

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Association News

INDUSTRIAL-ARTS CONFERENCE IN NEW JERSEY

An industrial-arts conference, sponsored by the industrial arts and supervisors' sections of the New Jersey Vocational and Arts Association and the American Industrial-Arts Association, was held recently in Newark, N. J. Mr. Edmund J. M. Herd presided at the morning session, and talks were given by L. Omer Asher, Dr. H. H. Ryan, and Fred O. Armstrong.

At the afternoon session Michael C. Tomasulo presided. A panel discussion was conducted on the topic, Ten Proposals for Industrial-Arts Education.

The panel personnel consisted of the following: Lawrence S. Chase, Discussion Leader, Superintendent of Essex County Schools; J. J. Berilla, Industrial Arts Department, Phillipsburg, N. J. Schools; C. De Witt Boney, Principal, Nassau School, East Orange, N. J.; William M. Devonald, Teacher of Industrial Arts, Cleveland Junior High School, Newark, N. J.; Leonard C. Johnson, Teacher of Industrial Arts, Miller Street School, Newark, N. J.; Herschel S. Libby, Superintendent of Schools, Irvington, N. J., and Leon Mones, Principal, Cleveland Junior High School, Newark, N. J.

♦ The new officers to head the printing teachers association for the new school year, 1944–45, have just been revealed by their mail ballot of the membership. The *National Association for Printing Education, Inc.*, announces that Harold G. Crankshaw, Central High School, Washington, D. C., is their new president. For the past year he has been vice-president and acting executive secretary. Long active in printing edu-

(Continued on page 32A)

Through fifty-seven years of specializing exclusively in lathe manufacturing the trade-wise have learned that the name SEBASTIAN means more value for their lathe-purchasing dollar.

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(Continued from page 30A)

cation and in the International Club of Printing House Craftsmen, he is now Vice-President of the Washington Club. Crankshaw is also active in other graphic arts and educational associations.

Their newly elected vice-president is Harold H. Kirk, Langley Junior High School, Washington, D. C., who has been in charge of the national program of student clubs for the graphic arts for the past nine years. The Student Honor Division continues its work despite the War and the program calls for greater expansion this tenth year of its existence. Kirk is well known in association work and is book editor of the N. A. P. E. Journal, as well as director of the honor clubs.

Fred W. Miller, Masonic Home and School, Fort Worth, Tex., the retiring president, is the new treasurer, succeeding James W. Loop, Charleston High School, Charleston, W. Va. Mr. Miller is well known as past president of the Fort Worth Printing House Craftsman Club and member of the International Association's Education Commission. Long active in association work, Mr. Miller is also publisher of the Journal, monthly publication of the printing teachers. He is also very active in Masonic activities in Texas.

Leroy Brewington, Head of the Department of Printing, Kansas State Teachers College, Pittsburg, Kans., editor of the Journal for the past two years, will continue in that capacity. Mr. Brewington was the first president of the association.

New members elected to the Board of Directors were: Herbert B. Downs, Weeks Junior High School, Newton Centre 59, Mass.; Arthur S. Williams, Government Printing Office, Apprentice School, Washington, D. C.; Herman A. Slater, Athens, Ohio; John C. Tranbarger, Indiana State Teachers College, Terre Haute, Ind.; Leroy Brewington, Kansas State Teachers College, Pittsburg, Kans.; Ignacio L. Guzman, Tuskegee Institute, Ala.; with Oscar A. Goetze, Golden, Colo., and Frank E. Latson, Glenwood Springs, Colo., a tie vote for District 14.

Continuing in office for another year are board members: George T. Hart, Franklin High School, Rochester, N. Y.; Joseph B. Coyle, Johnstown High School, Johnstown, Pa.; E. V. Harris, Murphy Junior High School, Atlanta, Ga.; William R. Baker, The Stout Institute, Menomonie, Wis.; Harold E. Sanger, Art Center, 32 West Randolph St., Chicago, Ill.; Fred W. Miller, Masonic Home and School, Fort Worth, Tex.; Edwin B. Harding, State Teachers College, Brookings, S. Dak., and Lieut. Allison J. McNay, Assistant Supervisor of Visual Education, Los Angeles, Calif., now with the Army Air Forces. —*Harold H. Kirk*, Chairman, Publicity Committee.

♦ A conference on industrial arts in modern schools was held in the Stowe College auditorium, St. Louis, Mo., on June 20, 21, and 22. H. M. Gray, Curtis Gordon, and J. W. Davis were the discussion leaders at the various sessions.

Among the topics taken up were (1) point of view, (2) objectives of industrial arts, (3) the focal point in the core curriculum, and (4) the unit method of instruction.

♦ The American Society of Tool Engineers has announced its twelfth Semiannual Meeting to be held in Syracuse, N. Y., on October 12, 13, and 14, 1944, with Hotel Syracuse as its headquarters.

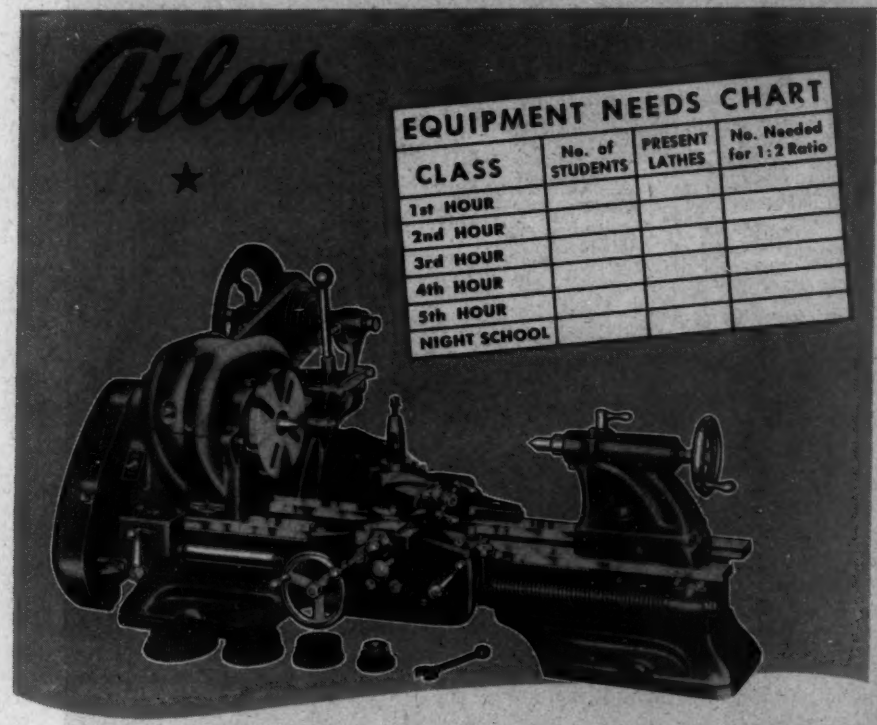
The meeting of the Board of Directors, Thursday, October 12, will precede the Technical Sessions which will open at 10 o'clock Friday morning, the 13th, continuing through that evening, and Saturday morning and afternoon.

The program is in charge of past president Ray H. Morris, of Hartford.

The Semiannual membership meeting and dinner will be held in the ballroom of Hotel Syracuse, Saturday evening, the 14th. The dinner speaker, James Y. Scott, is president of the Van Norman Company, president of the National Machine Tool Builders Association, and a member of the American Society of Tool Engineers.

♦ Thirty thousand Norway pine seedlings planted on 30 acres of cutover land by 400 high school students in one hour's time was the highlight of the Reforestation Institute held in Wisconsin, May 12 and 13.

The institute held in Rhinelander, center of one of Wisconsin's great paper areas, was devoted to discussions of reforestation and forest problems. The Institute featured 1000 square feet of exhibits of forestry methods and forest products, including impregnated laminated paper developments.



NOW THAT school is well under way you can check on how your present equipment compares with your needs.

Vocational educators recommend at least one lathe to each two students. This ratio permits plenty of practical "machine hours"—prepares each student to take his place in industry with a minimum of adjustment time.

Although most Atlas machine tools are still going for vital war production, it may not be long before your needs can be supplied. We'll be glad to send the catalogs that interest you. Simply check and mail the coupon below. Atlas Press Co., 1071 N. Pitcher St., Kalamazoo, Mich.

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Please send me the catalogs checked. Also the name of the Atlas distributor nearest me.

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Drill Press Catalog ☐ Coolant Pumps Catalog ☐

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Answers to Questions

ACETONE AND LACQUER

1106. Q.: Please furnish the following information on (1) the chemical make-up of acetone and its uses; and (2) the chemical make-up of lacquer thinner, its uses, etc.—*C. R.*

A.: (a) Acetone (Propanone, Dimethyly Ketone) CH_3COCH_3, a colorless, flammable liquid which is completely soluble in water and many other substances, for which reason it finds its greatest use as a solvent in acetylene gas cylinders; for the production of acetate rayon, artificial leather, photographic films, pyroxylin plastics, smokeless powder, airplane dopes, paint and varnish removers as well as in the manufacture of various alcohols and plastics.

b) Lacquer thinners is entirely too broad a field to more than very briefly summarize here since large volumes do not cover the field any too well.

Chemically, the solvents are divided into:

1. Esters, the most important group, to which belong amyl acetate and propionate.
2. Ethers (with alcohol) form the important metal lacquer solvents.
3. Ketones, as methyl ethyl and methyl propol.
4. Comparatively inodorous materials such

(Continued on page 34A)

Better Tools Make Better Craftsmen

Manual training instructors tell us that Disston tools help their students to produce better work. And these better results provide the incentive and encouragement which most youngsters need.

There are other reasons, too, why so many school workshops are stocked with Disston tools. The Disston Steel and extra skill used in making these tools give them strength and stamina to withstand the rough usage of beginners. That's especially important now that good tools are so scarce.

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For educational charts and other informative material on tools, available without charge for classroom work, write to us.

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(Continued from page 32A)

as diethyl carbonate, used for making lacquers for refrigerators.

5. Diluents, or nonsolvents which are used to bring thinner formulae within reasonable cost limits. These include xylol, alcohols, and perhaps toluol.

—Ralph G. Waring.

News Notes

♦ The seventeenth annual commencement banquet of the Evening Technical Engineering Division was held at the Milwaukee Vocational School Cafeteria, with Dr. William F. Rasche in charge. Addresses were given by John J. Metz, editor, INDUSTRIAL ARTS AND VOCATIONAL EDUCATION, The Bruce Publishing Company, and member, Board of Vocational and Adult Education, Milwaukee Vocational School; John R. Patlow, faculty counselor, Evening Technical Engineering Division; Kenneth Hess, president, Evening Technical Council; Robert W. Sloan, representing the graduating class; Robert Behling, editor-in-chief, *Technical News*; Howard C. Brem, president, Evening Technical Alumni Association; and A. J. Couture, president, Industrial Relations Association, and Representing the Industrial Training Conference.

Diplomas were presented to 16 graduates by Otto A. Jirikowic, organizer, Federated Trades Council, and member, Board of Vocational and Adult Education, Milwaukee Vocational School.

♦ "Education for New Tasks" is the theme for the twenty-fourth annual observance of American Education Week, to be observed this year from November 5 to 11, 1944.

The National Education Association has prepared materials to assist local schools in the observance of American Education Week such as a poster, leaflets, a sticker, a manual, plays, a movie trailer, radio scripts, newspaper advertising mats, and other materials. Address the National Education Association, 1201 Sixteenth St., N.W., Washington 6, D. C., for an order form and further information.

♦ The board of education of St. Louis, Mo., has recently approved a plan for training plane mechanics at the Hadley Technical High School. Not only high school students, but returning war veterans will be given instruction in this center. It is expected that the center will eventually develop into one of the largest in the country.

♦ The War Shipping Administration has announced that the U. S. Maritime Service will enlist youths between the ages of 16 and 17½ years for training for service in the Merchant Marine. Under the program, these youth, with the consent of parents, will be enrolled for six weeks' training as messmen and utility men in the steward's department, and 13 weeks' training for service in the deck and engine departments. Upon completion of training, the volunteers will be assigned to merchant vessels for immediate service.

♦ A school for training students in coal mining has been opened near Price, Utah, as a phase of the effort to increase wartime production of fuel. Approximately 900 mine workers from the ranks of clerks, grocers, and mountain men are being trained "on the job." The training is speeded up so that the learners in a few months are taught skills and related knowledges that fit them for mine jobs.

♦ Examinations for first assistant head of department in day high schools in shop subjects (trades) and in mechanic arts (industrial arts) will be held this fall by the New York City Board of Examiners. Tests will be given in eight different subjects, to be conducted in October or November. Of the shop subjects, two — beauty culture and needle trades — will be open to men and women. Tests in the various trade subjects will be limited to men.

♦ Word has been received that a vocational course in woodworking trades will be offered for the first time by the schools at Mooresville, N. C.

♦ With the passage of the GI Bill of Rights by Congress, colleges and universities are looking forward this year to a tremendous influx of war veterans in the postwar years. The bill permits any veteran not over 25 years of age, to get a minimum of one year of schooling at government expense. He may enter any trade or technical school, college, or graduate school.

Free tuition up to $500 a year is provided by the government and all textbooks, classroom materials, and laboratory fees are paid.

After the first year, if the veteran has shown satisfactory progress, he will be entitled to three more years of free education to make up a total of four years. This will enable him to receive a complete college education.

Veterans over 26 when they entered the service will receive the same benefits if they can prove that their education was delayed, interfered with, or impeded.

♦ At the recent commencement at Wayne University, the following received Master's degrees with a major in industrial education: John Henry Amos, George F. Billey, Wendell Addison Easton, Charles N. Egbert, Roland Russell Fraser, Louise B. Henderson, Lee Banner James, Lewis E. King, Harris P. Moreau, Henry C. Seekamp, G. Manson Taylor, and Spencer Harry Wright.

♦ Through the educational service maintained by the Bureau of Mines of the U. S. Department of the Interior, journeys over and under the world were experienced vicariously by 7,691,000 persons by means of sound motion pictures shown during the past 12 months.

In South America, Australia, the British Isles, Mexico, and even far-off India and China, as well as throughout the United States, the Bureau's sound motion pictures were used in manufacturing plants and in schoolrooms.

(Continued on page 36A)

Sheldon

PLANNING ASSISTANCE

. . . can help you

School architects, administrators and teachers, aware of postwar educational imperatives, are basing school building designs on tomorrow's needs. In planning special rooms and selecting vocational and laboratory equipment Sheldon can be of unusual assistance. Sheldon will also assist you in compiling budget estimates and writing specifications. Write today — request Sheldon Planning Assistance. Without obligating you in any way Sheldon Engineers will call and discuss your problems, ideas and plans.

LABORATORY AND VOCATIONAL Furniture

E. H. SHELDON & CO. · MUSKEGON, MICHIGAN

The finest and the first in 16mm projectors, with their designer, Alexander F. Victor, whose inventions and improvements over the past 21 years have bridged the gap between the first Victor Ciné Projector (right) and the new Victor Animatophone (left).

International Relations: "After the war we have all got to learn to live together . . . we can't all travel around the world to learn to understand each other . . . we can do it through 16mm film better than any other way," said C. R. Reagan, director, non-theatrical division, Bureau of Motion Pictures, Office of War Information.

Better Education: "This medium of communication makes possible . . . to bring the truth to millions upon whom depends the realization of our democratic goals," declared Dr. Clyde V Arnspiger, vice president of Encyclopedia Britannica Films, Inc.

16mm BECOMES OF AGE

21 years old August 12, 1944; Born August 12, 1923

NOW 21 YEARS OLD, has the 16mm industry reached its full growth? Are there new horizons of achievement before it?" The answer was given by leaders of education, business, industry, and government as they honored Alexander F. Victor, designer and producer of the first 16mm camera and equipment. The magic of 16mm sight, sound and sequence has already transformed methods of teaching, training, selling and entertainment. But as 16mm Comes of Age, its future will even overshadow its brilliant present. Almost every field of endeavor in every corner of the world will look to Victor who first brought 16mm into being to provide the 16mm camera and projector of tomorrow.

Victor, whose advanced designs and constant improvements have blazed the trail for 21 years of 16mm achievements, is ready to meet the responsibility of the future.

Post-War Markets: "Through 16mm motion pictures in Latin American countries new post-war markets are being created . . . standards of living raised . . . and all American business and industry will benefit" predicted Robert C. Maroney, director of motion picture distribution for the Coordinator of Inter-American Affairs.

Twenty-one years ago the first 16mm cameras, projectors and films in the world were announced in this full page newspaper advertisement which A. F. Victor, president, and S. G. Rose, executive vice president of Victor Animatograph Corporation are re-reading as the 16mm industry comes of age.

First in the fight for a safety standard for non-theatrical film and equipment, first to design and produce 16mm cameras and projectors, A. F. Victor responds to the tributes paid him by leaders in education, business, industry and government.

For Peace and Prosperity—
Buy More War Bonds

VICTOR ANIMATOGRAPH CORPORATION
ESTABLISHED 1910
Home Office and Factory: DAVENPORT, IOWA
NEW YORK (18)—McGraw Hill Building, 330 W. 42nd St.
CHICAGO (1)—188 W. Randolph

(Continued from page 34A)

The main distributing center for the films is the Graphic Service Section at the Bureau of Mines Central Experiment Station, 4800 Forbes St., Pittsburgh, Pa., where a complete library of all pictures is maintained. Subdistributing centers are maintained in 18 other states.

No charge is made for the loan of the films, except that borrowers pay transportation charges to and from the distributing centers. The loss of films, or damage other than ordinary wear and tear, must be paid by the borrower. The sound films are all in 16mm. size, but there are silent versions of some films in both 16- and 35mm. sizes. All requests for films should be addressed to the Pittsburgh distributing center of the Bureau of Mines.

♦ BRIG. GEN. FRANK T. HINES, Administrator of the Retraining and Re-employment Administration, recently announced the membership of the Policy Board of the Retraining and Re-employment Administration had been completed, as follows:

Frances Perkins, Secretary of Labor; Watson B. Miller, Assistant Administrator, Federal Security Agency; Lawrence B. Appley, Deputy Chairman and Executive Director, War Manpower Commission; Col. Paul H. Griffith, chief of the Veteran's Personnel Division, Selective Service System; H. V. Stirling, director of the Vocational Rehabilitation Service, Veteran's Administration; Arthur S. Flemming, Commissioner, Civil Service Commission; Brig. Gen. William F. Tompkins, director of the Special Planning Division, War Department Special Staff, War Department; Vice-Admiral Randall Jacobs, Chief of Naval Personnel, Navy Department.

The executive order provides that with the assistance of this board the Retraining and Re-employment Administration is charged with the co-ordination of the activities of all government agencies relating to the retraining and re-employment of persons discharged or released from the armed services or other war work, including all work directly affected by the cessation of hostilities or the reduction of the war program.

♦ A new apprenticeship training program for the rehabilitation of vocationally handicapped veterans has been inaugurated by The Cooper-Bessemer Corp., Mount Vernon, Ohio. A group of veterans has already started the course, according to Steven Hurtuk, chief of the training division at the U. S. Veterans Administration Hospital at Brecksville, Ohio. In addition to the instructors who will train the discharged veterans, Cooper-Bessemer's course is supervised by an Apprenticeship Committee consisting of three labor representatives and three management representatives assisted by the Mt. Vernon superintendent of schools as an ex-officio member of the committee.

The Cooper-Bessemer Corp., is engaged in the production of Diesels, gas engines, and compressors for the Navy, Army, Maritime Commission, and critical industries.

Accredited veterans who apply for apprentice training are given a comprehensive aptitude test to determine the course of work in which they are most likely to succeed. They will receive standard apprentice pay from Cooper-Bessemer, and in addition, each man will receive from the government a monthly maintenance allowance. Those who complete Cooper-Bessemer's course will definitely qualify as journeyman machinists.

♦ Production of the first motion picture in color on the subject of molded plastic-plywood construction of multiengined aircraft has just been announced by the Fairchild Engine and Airplane Corporation.

The Princeton Film Center of Princeton, N. J., will be the producers.

The Fairchild AT-21 "Gunner," versatile twin-engined plastic-plywood airplane produced by the Fairchild organization, is the subject aircraft of the film.

Nationwide distribution in the United States will be handled exclusively by The Princeton Film Center, Princeton, N. J.

♦ A 90-page pamphlet, *Service in the Armed Forces*, Victory Corps Series, pamphlet No. 6, which was published recently will be very valuable for use in schools in providing information to boys concerning the various branches of military service. The bulletin may be secured from the Superintendent of Documents, U. S. Government Printing Office, Washington, D. C., at the cost of 20 cents. It contains 273 questions and answers and is intended to supplement *Guidance Manual for High School Victory Corps*, Victory Corps Series, Pamphlet No. 4.

♦ Victor Projectors get plenty of use in North Africa. Not only are there matinee and evening performances at the Red Cross Theater with the latest Hollywood attractions, but it has been found necessary to supplement the programs with morning flickers, at the Service Club. The boys like their "movies" and recently one batch of Victor projectors was set up and in operation in various locations of the dark continent, just seven days after leaving the Victor plant in Davenport, Iowa, making the entire trip by air.

♦ According to WMC, the total enrollments of women of all ages who have received training in public vocational and college war training programs conducted in all 48 states and the territories of Hawaii and Puerto Rico from July 1, 1940 to March 31, 1944, including 256,577 enrolled by the NYA (discontinued in 1943), were 2,461,943.

The largest single number enrolled, 484,254, was in programs providing training in occupations required in the production of aircraft. Enrollments of women in machine shop occupations totaled 198,871, and in shipbuilding occupations the enrollments amounted to 115,054.

Of the 230,411 enrollments of women in college-level courses under the engineering, science and management war training programs, 19 per cent were in engineering drawing and similar subjects applicable to many types of war production jobs. The remainder of the enrollments in college courses were in such subjects as personnel and labor relations, inspection and testing, communications, engineering fundamentals and industrial organization and management.

(Continued on page 38A)

PAID FOR
ANOTHER SHARE IN FREEDOM

WAR BONDS REACH WORKERS IN THIS REGISTERED, WINDOW TYPE SAFETY ENVELOPE. EACH BOND HELPS US WIN.

The War Bonds YOU buy reach you in envelopes like the one pictured above via Uncle Sam's vast delivery system, the Post Office Department. *Envelopes* are doing many a war-time job—will do many a peace-time job. That is why your curriculum can profitably devote time to the study of envelope printing.

WESTERN STATES ENVELOPE CO.
MILWAUKEE WISCONSIN

THREE CAUSES OF EYE FATIGUE IN WORKERS

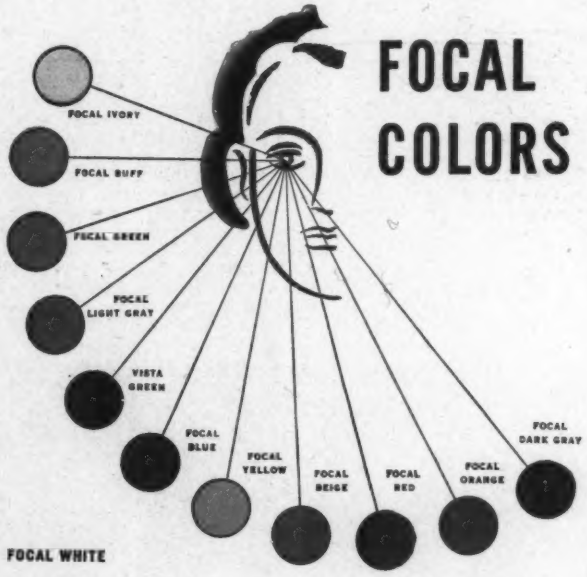
UNNECESSARY TRAVEL—Eyes have a habit of wandering. On a long monotone machine, the eye covers a great deal of unnecessary distance because there's nothing to hold it at one spot. Just as wasted steps tire out the body, so this needless travel which accomplishes nothing, tires out the eye.

TENSION—Hold out your arm, tensing the muscles. Notice how quickly they grow weary. The same thing happens to a worker's eyes when material he is fabricating is too similar in color to his machine. Wasted effort is required to differentiate between material and machine.

CONSTANT ADJUSTING—Go from a sunlit street into a moving-picture theater. For a minute you are so blind that you have difficulty finding a seat. A worker who glances up from a light-colored machine to a dark wall (or vice versa) has the same experience to a lesser degree.

COLOR DYNAMICS

A new system of using color to minimize workers' eye fatigue which will interest all teachers in trade or industrial schools.



• No matter what type or color of material a given machine is processing, one of these focal colors will provide a satisfactory contrast with it. Applied to the operating parts of the machine, this focal color reduces strain, eye-fatigue and accidents.

THERE is a tendency to forget that people work not only with their hands, *but also with their eyes*—and that the seven muscles which operate the movements of the eyeball get tired just like arm or leg muscles.

This eye fatigue leads to headaches, "nerves", digestive upsets, and depression—eventually to absenteeism and lowered production. Therefore, one important objective of Color Dynamics is to do away with the causes of eye fatigue.

1. Unnecessary eye travel is minimized by painting the critical parts of the machine in a *focal color* which focuses the worker's attention exactly where he wants it to be.

2. Tension is reduced by choosing a focal color which affords a clear contrast between the machine itself and the material being fabricated.

3. Constant Adjusting is eliminated by painting walls in front of machines in "eye rest" colors.

• A free copy of the new book "Color Dynamics" will be mailed to any teacher who sees an opportunity of fitting this system into his courses. You will find this study of the utilization of color energy both stimulating and practical. For your copy write Pittsburgh Plate Glass Co., Paint Division, Dept. IV-10, Pittsburgh 22, Pa.

PITTSBURGH PAINTS

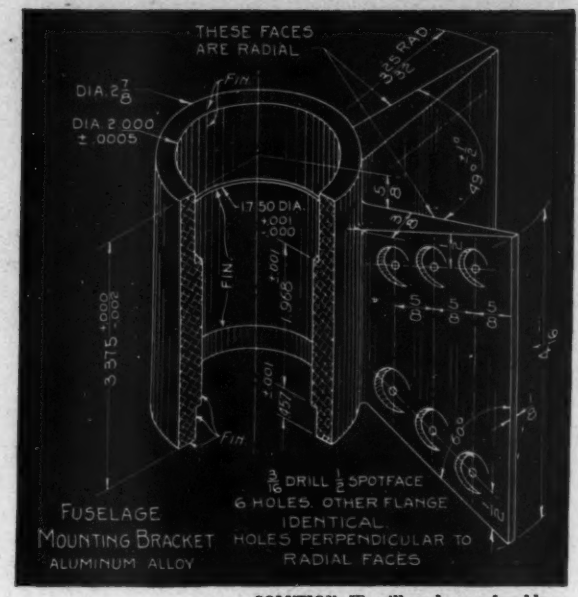
Pittsburgh Plate Glass Company, Pittsburgh, Pa.

PITTSBURGH STANDS FOR QUALITY PAINT AND GLASS

HERE'S MOUNTING CONFIDENCE FOR YOUR CLASS!

Ask your students to draw the correct orthographic views of this Fuselage Mounting Bracket. They'll derive solid satisfaction from this concentrated problem—and it will help them to learn blueprint-reading.

First, introduce your students to Typhonite Eldorado! This preferred tool of professional draftsmen delivers lines that are uniform and brilliant. It makes clear drawings that translate into sharp, easy-to-read blueprints. Typhonite Eldorado pencils will give your young students pride in their work and pleasure in its execution.



SOLUTION: We will send you a free blueprint showing the solution of this problem. Write to the address below within thirty days. Specify Blueprint No. 128-J10.

TYPHONITE

ELDORADO

SCHOOL BUREAU, PENCIL SALES DEPT., JOSEPH DIXON CRUCIBLE COMPANY, JERSEY CITY 3, N. J.

(Continued from page 36A)

The vocational war production and food war training programs are administered by the U. S. Office of Education, Federal Security Agency, through State Boards for vocational education and local public schools.

♦ Because of the importance of visual aids in vocational training, authorization to build adequate projector equipment for slide films and miniature slides to supply essential requirements has been extended.

The Society for Visual Education, Inc., 100 East Ohio St., Chicago 11, Ill., has just issued a folder describing S.V.E. projectors and accessories. Any of these can be supplied to any school upon receipt of an official order with a priority of AA-5 to AA-2, or with W.P.B. approval on Form 1319.

The Society for Visual Education Inc. will furnish those interested with Form 1319 and the address of the nearest W.P.B. field office.

♦ The U. S. Office of Education offers a bibliography entitled "Some Source Materials From Government Agencies on Wartime Consumer Education." This booklet lists and describes pamphlets available in various phases of consumer education, such as: rent control, community canning, family saving and spending in wartime, care of vacuum cleaners, wise meat buying, and many other subjects.

The material referred to has been prepared for use in elementary and secondary schools. The bibliography can be ordered from the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C., as (Leaflet No. 67) at 5 cents a copy.

♦ Men and women are needed at once to test, inspect, and design engineering materials and machinery, and to assist in experimental research.

A degree in engineering or a degree with a major in astronomy, chemistry, geology, mathematics, physics, or engineering sciences, including at least six semester hours of engineering subjects is required. Persons having a degree supplemented by the special engineering sciences and management war-training course sponsored by the U. S. Office of Education may also qualify.

Positions pay $202 a month for a 48-hour week. Appointees must be willing to work in Washington, D. C. Interested persons should write the U. S. Civil Service Commission, New Post Office Building, Chicago 7, Ill.

♦ At its June meeting, the state board of education, Raleigh, N. C., approved plans for equalizing salaries of Negro and white teachers with surplus funds expected to be on hand during the 1944–45 school term—thus fulfilling a pledge made a decade ago to the Negroes of North Carolina.

♦ The entire library of educational and travel films produced and long distributed by Burton Holmes Films, Inc., of Chicago, has been transferred to the Bell & Howell Filmo-sound Library, 1801 Larchmont Ave., Chicago, Ill.

The original negatives, many of them photographed personally by the eminent lecturer, Burton Holmes, on his world travels and explorations, have been put into the custody of the new distributor, and all orders will henceforth be printed from them. Sale and rental prices remain unchanged.

♦ The Office of Defense Transportation today informed automotive repair shop owners that vocational training schools will conduct special

(Continued on page 40A)

Industrial-arts students, summer session, 1944, at State Teachers College, California, Pa. The group shown, includes students from Ohio, Maryland, Virginia, West Virginia and Pennsylvania. Dr. S. L. Coover is the director of the industrial-arts department

RECONVERSION

WILL NEED MILLIONS OF—

Trained Hands!

With termination of war contracts America will soon make one of its amazing "quick changes" in reconverting to peace-time production. Thousands of Ditto-equipped plants throughout the country will need millions of *trained* minds and hands!

And with Ditto's help you can train your students faster! Ditto makes multiple copies of anything typed, printed, written or drawn—*with touch-a-button simplicity and without error!* You'll find Ditto an invaluable aid to modern teaching!

•

Today as always genuine Ditto Supplies are available for keeping previously purchased gelatin and liquid type machines operating at top efficiency.

DITTO

Write TODAY for "Copies—Their Place in Business" and samples of mechanical drawings reproduced on Ditto. *Free!*

DITTO, INC., 632 S. Oakley Blvd., Chicago 12, Ill. • *Manufacturers of Business Machines and Supplies*

FIRST PRIZE

Cartooning Section, 1944. Drawn by Sid Hutchings, Jr., Omaha Technical High School, Omaha, Nebraska. Teacher: Miss Anna Myers.

Enter the
HIGGINS MEMORIAL AWARDS
30 CASH PRIZES ★ 30 GIFTS
CHANCES FOR SCHOLARSHIPS

It's easy to compete. Work produced with drawing ink in your classroom which fits in with your regular course is eligible. Divisions include Mechanical Drawing and Production Illustration, Free Hand Drawing in Black and Colored Inks and Cartooning.

There is a local department store sponsor in your area who gives Extra Awards.

Ask your teacher for further details or write to Scholastic, 220 East 42nd Street, New York 17, N. Y.

16TH CONSECUTIVE YEAR OF HIGGINS SPONSORSHIP

SEND FOR A COLOR CARD

HIGGINS INK CO., INC. 271 NINTH STREET BROOKLYN 15, N. Y.

SAFETY IN THE SCHOOL SHOP

SAMUEL F. HALL
High School
Clayton, Mo.

(Continued from page 300 of the September, 1944, issue)

How to Use the Wood Chisel Safely

General Information

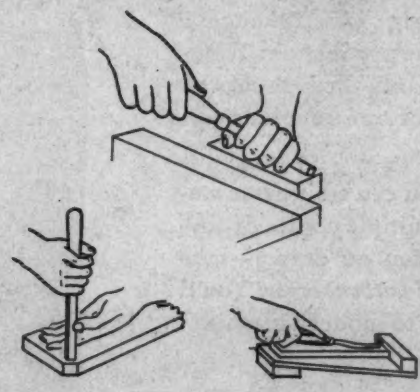
Of the many tools we have in our shop, the wood chisel causes the greatest number of accidents. This is due to two causes: (1) lack of knowledge of its use and (2) carelessness. Both of these causes can be overcome by the cooperation of the boys in the class.

Specific Information

1. Always use the chisel for the job it is intended.
2. Always have your fingers behind the cutting edge of the chisel.
3. Push the chisel from you when possible.
4. Keep the chisel sharp. Use the whetstone often.
5. Use the mallet for driving a chisel.
6. See that the handles are tight.
7. Watch for *mushroom* handles.
8. Keep the chisel off the floor.
9. Return chisels to the proper place after using.
10. Lay the chisel on the bench with the point away from you.

Assignment

1. What is the difference between a loose handle and a mushroom handle? .....
2. How would you hold a chisel for doing horizontal trimming? .....
.....



Safe ways of using the chisel

3. How would you hold a chisel for doing convex trimming? .....
.....
4. How would you hold a chisel for doing concave trimming? .....
.....
5. Should good workmen talk and chisel at the same time? .....
6. Is a cold chisel held like a wood chisel? What is the difference? .....

References

Stanley Educational Charts, No. 120.

Fryklund & LaBerge, *General Shop-Woodworking*, p. 36.

Herman Hjorth, *Basic Woodworking Processes*, p. 83.

(To be continued)

NEWS NOTES

(Continued from page 38A)

classes in automotive maintenance and repair for particular makes of cars or trucks provided they can furnish at least ten students.

The ODT explained that some shop owners have preferred training their own employees instead of having them trained in groups with employees of dealers who handle other makes of vehicles.

The Maintenance Section of the ODT's Highway Transport Department said that if a manufacturer of a certain make of vehicle has a prepared course of instruction, this can be followed by the instructor.

The ODT now has vocational training classes in 200 cities throughout the country, sponsored by the United States Office of Education and conducted by public vocational schools. These classes, dealing with all phases of automotive maintenance and repair, include both pre-employment and supplementary courses.

♦ The Forest Products Industries, Inc., Washington, D. C., are offering a series of booklets and visual aids intended to supplement textbook study of American forests. These booklets and visual aids aim to carry the new program of forest planning to the children of America. The material offers up-to-date knowledge of forest resources, practical information on forest conservation, and new developments in the use of the forest harvest. A complete bibliography is available to teachers in elementary and secondary schools.

♦ A center for training airplane mechanics will be established at Hadley Technical High School, St. Louis, Mo. High school students, as well as returning war veterans, will be admitted to the course.

(Continued on next page)

(Continued from previous page)

HONOR BANQUET AT MILWAUKEE VOCATIONAL SCHOOL

An honor banquet was given at the City Club, Milwaukee, Wis., in honor of seven teachers who had completed twenty-five years of service and eighteen who had completed twenty years of service in the Milwaukee Vocational School.

Those who have finished twenty-five years of service are: Bess D. Ellis, Leo J. Hercules, Margaret McGuine, Elizabeth Robinson, Isabel Scholl, James Sidlow, and Susie E. Wing.

Those who have finished twenty years of service are: Anna G. Anderson, Joseph Barta, Elton R. Cleland, Albert H. Ganswindt, Fay S. Hall, Margaret Hooper, George James, Nicholas Johnson, Lenna A. Larsen, Frank A. Maas, Dan McCulloch, Herbert W. Riegor, Ralph N. Steel, Erna Van Haagen, Henry Wagner, Ray Woods, and Leah Yager.

G-I BILL OF RIGHTS

The G–I "Bill of Rights" (S.1767) has been passed by the 78th Congress and signed by the President.

It provides that any person who has served in the active military or naval service on or after September 16, 1940, and prior to the termination of the present war, and whose education or training was impeded, delayed, or interrupted by reason of his entrance into the service, may begin a course of study or training not later than two years after his discharge or the termination of the war. Such education or training must be completed within seven years after the termination of the war.

Any eligible person shall be entitled to education or training or a refresher or retraining course, at an approved educational or training institution, for a period of one year, or for such lesser time as may be required for the course chosen by him. Upon the satisfactory completion of such course of education, according to the standards and practices of the institutions, such person may be entitled to an additional period of education or training, not to exceed the time spent in active service on or after September 16, 1940 and before the termination of the war.

Under the law the Administrator of Veterans' Affairs is required to pay to the educational or training institution, for each person enrolled in full-time or part-time course of education or training, the customary cost of tuition, and such laboratory, library, health, infirmary, and other similar fees as are regularly charged, and also for books, supplies, equipment, and other necessary expenses, exclusive of board, lodging, and other living expenses.

Any member of the armed forces, while enrolled in and pursuing such a course or training will be paid a subsistance allowance of $50 per month, if without dependents, or $75 per month, if he has dependents.

Any trainee who fails to complete the course of training or education afforded may be required, at the discretion of the administrator, to return any books, supplies, or equipment not actually expended or to repay the reasonable value thereof.

New Publications

Standard Aircraft Worker's Manual

Edited by Wendell S. Fletcher. Imitation leather binding, spiral, 164 pages, 4 by 6¼ in., illustrated. Price, $1.50. Published by Fletcher Aircraft, 625 No. San Fernando Road, Burbank, Calif.

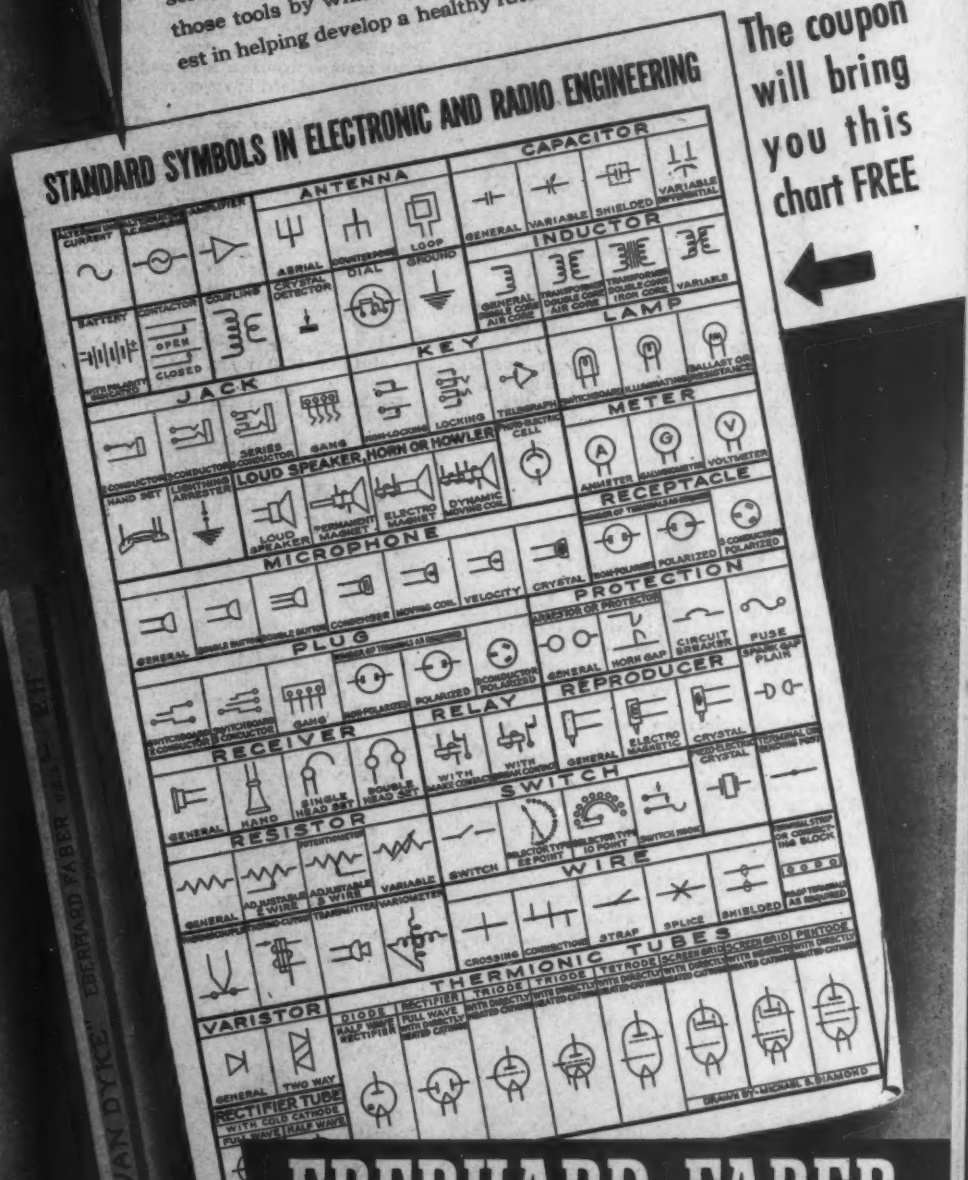
This is the seventh edition of this handy little manual. It is divided into 8 sections which treat the subject matter under the following headings: fundamentals of aircraft construction; aluminum and its alloys; steel; AC, AN, and B standard parts; assembly, riveting, and installation; care

(Continued on page 47A)

Mechanical Drawing Instructors . . .

In proffering this WALL CHART (16½ x 26½ ins.) FREE, to vocational instructors, EBERHARD FABER seeks opportunity to be of service through him to the Youth of America. As manufacturers of those tools by which ideas are put on paper, we have a lively interest in helping develop a healthy future for the oncoming generation.

The coupon will bring you this chart FREE



EBERHARD FABER

LEADERSHIP IN FINE WRITING MATERIALS SINCE 1849

EBERHARD FABER PENCIL CO., Educational Dept. IA-10, 37 Greenpoint Ave., Brooklyn 22, N. Y.
Please send me FREE your Wall Chart No. 5 "Electronic and Radio Symbols."

Name_____

School_____

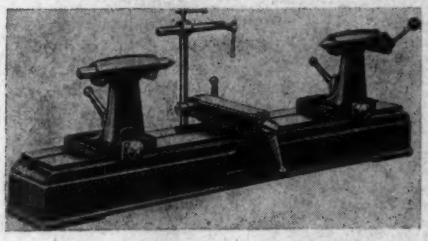
Address_____ City_____

Shop Equipment News

New Products — Publications

DELTA BENCH CENTER

The need for accurate and easily operated inspection and testing devices has prompted The Delta Mfg. Co., 620 Vienna Ave., Milwaukee 1, Wis., to design the new Delta-Milwaukee Bench Center shown herewith.



Delta bench center

This new Delta-Milwaukee Bench Center offers unique advantages in the design, construction, and operation of the indicator support bracket. This bracket can be firmly and quickly locked in any position on the bed by merely operating a handle at the front. The part that holds the indicator can be placed in any position — vertical or horizontal. Large, convenient, clamp handles are provided making it unnecessary for the operator to use pliers or wrench to clamp the indicator or any other part in place.

The top surface of the bed is flat, and the head and tail stocks can be reversed so that the unit may be operated from either side, adding to its convenience and flexibility.

The interchangeable feature of the head and tail stocks results from the fact that they are identical castings, precision bored to make alignment in any position true and accurate. Both stocks contain hardened and ground 60-deg. angle centers for holding the piece to be inspected.

The maximum distance between centers is 19½ in., the over-all length is 32 in., and the width 5½ in. The dimensions of the ground bed are 4½ by 30 in.

For brief reference use IAVE—810.

NEW PRECISION GAUGE INSTRUMENTS

Continental Machines, Inc., 1301 Washington Ave., South, Minneapolis, Minn., has announced a new complete line of gauge instruments to fill the demand for a broader application of gauge blocks.

The twenty instruments of the gauge instrument set, in combination with gauge blocks, perform practically all precision measuring functions. With the gauge holders and caliper bars, any type of "go" or "no go" snap gauge can be made up in a matter of seconds, accurate to millionths of an inch. The instruments also provide tools to make a precision height gauge, fulfilling all the duties of a standard height gauge, yet 1000 times more accurate.

To increase the application of gauge blocks, the set includes an adjustable vernier gauge which enables gauge-block combinations to be made in increments of 1/10 of one ten-thousandth of an inch.

Instruments are sold separately or supplied in solid wood instrument cases. The entire set of instruments is available as a complete inspection laboratory, enclosed in an especially made walnut case.

For brief reference use IAVE—811.

New precision gauge instruments

IMPROVED WET GRINDER

A new wet grinder being offered by Boice-Crane Company, 932 Central Avenue, Toledo, Ohio, has a perfectly true, concentric running, 10-in. Berea quarried sandstone wheel, accurately centered on its arbor, so as to grind a straight bevel from heel to edge without weakening tool temper.

Designed for proper grinding speed of 120 r.p.m., the grinder throws no water and may be belted to a 1750 r.p.m. motor, line shaft, or gas engine. Every grinder is given a running test.

For brief reference use IAVE—812.

A PRECISION SURFACE GRINDER

The new model G-1 DoAll Surface Grinder, specially designed for efficient wet or dry grinding, and for automatic hydraulic feed or smooth-operating manual feed, has been announced by Continental Machines, Inc., 1301 Washington Ave., South, Minneapolis 4, Minn.

The new model, because of special developments in balance and construction, makes this grinder capable of new achievements in the field of precision grinding and fine finish. Built for tool room use and light production work where accuracy is paramount, it has a table travel of 21 in., and transverse travel of 7½ in., with a vertical wheel head adjustment of 12 in., using a 7 by ½ by 1¼-in. wheel. Extreme rigidity, so important to precision finish, is found in the scientific balancing of the 2200-lb. weight of the machine. This great weight while absorbing vibration, is used to greatest advantage at all vital points.

The precision ball bearing spindle is raised or lowered by a gradualed hand wheel operating through hardened and ground gears which minimize wear.

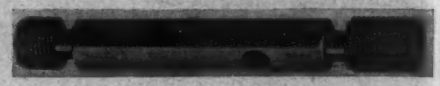
The change from full hydraulic to full manual operation can be made in an instant.

For brief reference use IAVE—813.

G-1 DoAll surface grinder

CARBIDE THREAD PLUG GAGES

A complete line of carbide thread plug gages is announced by the Jansson Gage Co., 19208 Glendale Ave., Detroit 23, Mich. Three styles of carbide thread plug gages are offered, made to American Gage Design standards. Solid carbide



Carbide thread plug gage

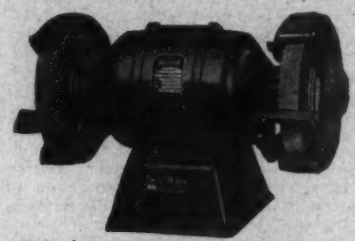
is used for the smaller size gaging members. Larger sizes have a carbide bushing over a steel body. All gaging members are ground from solid carbide.

A complete size range is available from .112 in. to 3 in., accurately ground to Class X or Class Y tolerances. Any pitch can be supplied in American National Form.

For brief reference use IAVE—814.

Grinder With Overload Capacity

The Baldor Electric Company, 4351 Duncan Ave., St. Louis 10, Mo., announces the development of a new 7-in. grinder described as their 7100 series grinder. This new development includes the following features:



Grinder with overload capacity

Specially designed motor which is cool running when carrying normal load and which has 100 per cent over load capacity; prelubricated ball bearings which require no lubrication during their entire life; first-grade wheels balanced with Baldor patented balancing flanges.

Bulletin No. 318 giving complete description will be sent upon request.

For brief reference use IAVE—815.

New Electrode for A.C. Welding

A new general purpose electrode for mild steel, designated as "Fleetweld 35," and made specifically for operation on a.c., has just been announced by The Lincoln Electric Company, Cleveland, Ohio.

This new shielded arc electrode, which will also operate on d.c., with either polarity, is available in ⅛-in., 5/32-in., and 3/16-in. sizes.

"Fleetweld 35" conforms to American Welding Society specifications for arc welding electrodes classes E-6010 and E-6011, and is made in the standard 14-in. lengths, and packed in 50-lb. containers.

For brief reference use IAVE—816.

NEW MODEL BENCH TYPE BELT GRINDER

The Porter-Cable Machine Co., Syracuse, N. Y., has announced a new addition to their line of abrasive belt grinders, a Model BBS bench type belt grinder.

This grinder unit uses an endless metal cutting abrasive belt 2½ in. wide and 60 in. long, running 4500 s.f.p.m. The grinder is driven by a 1 h.p. motor. The flat bed grinding area is 2½ by 8 in., and it has a soft resilient contact wheel 7 in. in diameter by 2½ in. face, capable of grinding

(Continued on page 44A)

Is Your School Equipped as Well as it Should Be to Play the Part it Should in the Big G.I. Program?

SERVICEMEN can't sit around waiting for rehabilitation plans to take form after they return.

Those are things that should be taken care of now — so the men can immediately start taking advantage of them when they're mustered out.

The G.I. program of helping prepare men for skilled jobs in industry is even bigger and more important then helping prepare them for war.

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To do your part of the job well and efficiently Uncle Sam wants you to have all the training equipment, machines and supplies you need. Refer to your Brodhead-Garrett catalog now for all these requirements — and send your order early.

BRODHEAD-GARRETT CO.

"Supplying Defense Training Needs to Schools in All 48 States"

CLEVELAND, OHIO

New bench type belt grinder

(Continued from page 42A)

all types of metal. The wheels are 6 in. to 8 in. in diameter. The entire unit is ruggedly constructed and operates practically vibrationless.

For brief reference use IAVE—817.

AN ABRASIVE BELT GRINDER

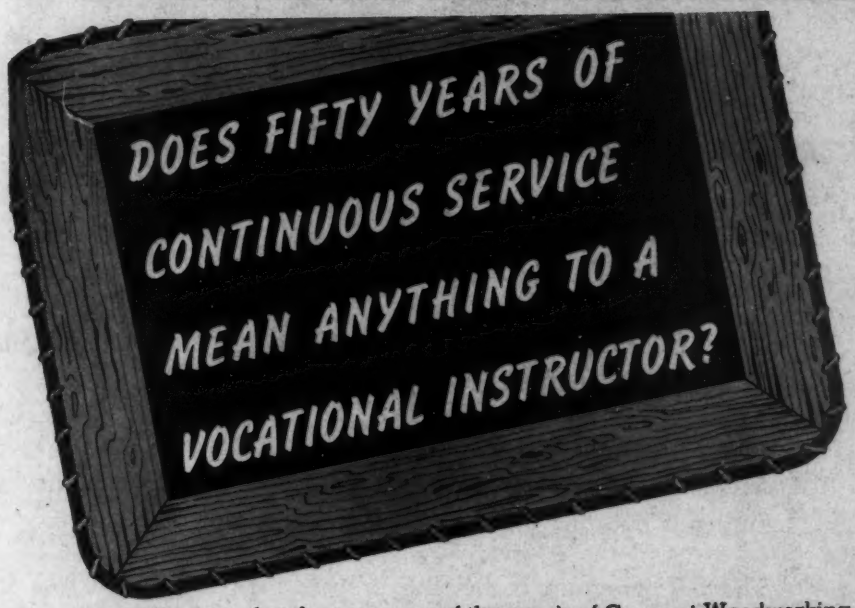
A new 10-in. wet-n-dri Abrasive Belt Grinder has just been announced by Hammond Machinery Builders, Inc., 1665 Douglas Ave., Kalamazoo 54, Mich.

This new 10-in. wet-n-dri grinder carries up to a 10-in. abrasive belt. Practically any material that can be ground can be surfaced or finished on the Hammond Model V-10. Operations such as deburring, descaling, chamfering, beveling, and the finishing of pads, bosses, and thin sections of castings, forgings, stampings, etc., are easily within the range of work possible on this new grinder.

The machine is now equipped as standard with either an oscillating or a plain table, depending upon the class of work which it is to handle. The oscillating table has a micrometer stop graduated in .001 in. for accurately controlling depth of grind. An automatic belt tensioning device insures automatic taking up of belt stretch and provides vibrationless operation. Large capacity coolant tank unit is located in the base of the machine, and the coolant flow controls are located outside the machine within easy reach of the operator.

For brief reference use IAVE—818.

Abrasive belt grinder



It means, in this case, that there are tens of thousands of Crescent Woodworking Machines in daily operation all over the country in every type of industry It is significant because your students are very likely to be called upon to operate a Crescent Woodworking Machine after you have trained them. Significant, also, is the fact that the highest type of production standards have always been rigidly observed enabling Crescent Woodworking Machines to enjoy the continued confidence of both the woodworking industry and vocational instructors. Still another point is the low maintenance cost of Crescent equipment. (The all-time average replacement cost is less than 5 cents per month, per machine!) In addition the product of a fifty year concern has the advantage of highly developed engineering knowledge from which stems greater accuracy, advanced safety devices, and many other desirable features. You can always choose Crescent equipment with the utmost confidence in their quality, safety and their ability to help you provide a more thorough training program.

If your plans call for a single machine or a complete shop installation Crescent will be glad to assist you in recommending the proper equipment. Of course, you won't be obligated. Write today for Crescent's catalog and literature.

Crescent MACHINE COMPANY LEETONIA OHIO

AN INSTRUCTIONAL BOOK ON FILES

"Files — How to Select, Use, and Conserve Them" is the title of a small booklet which contains a short but thorough course on how to select, use, and care for files.

The booklet is published by the Delta File Works, Inc., Philadelphia, Pa.

For brief reference use IAVE—819.

NEW BOOKLET ON PRINTING PLANT EQUIPMENT

The Hamilton Manufacturing Company, Two Rivers, Wis., has issued its latest catalog No. 20, containing 72 pages devoted to new printing plant equipment, both steel and wood. The catalog lists type cabinets, proofreader desks, furniture cabinets, type cases, space-material cases, lead and slug cases, case stands, roller cabinets, storage galleys, cut-storage cabinets, and letterboard cabinets.

For brief reference use IAVE—820.

COMMERCIAL ARTIST'S HANDBOOK

"The Commercial Artist's Handbook," the fourth in a series of educational publications, has just been announced by the X-acto Crescent Products Company, makers of X-acto knives. This 16-page booklet describes and illustrates such important techniques as photo retouching, negative and prints, air brush friskets, butt-patching, Ben Day, and silk-screen work. The booklet is available at the small price of ten cents from the X-acto Crescent Products Company, 440 Fourth Ave., New York 16, N. Y.

For brief reference use IAVE—821.

NEW MANAGER APPOINTED

The L. S. Starrett Co., Athol, Mass., has announced the appointment of Mr. Carlton S. Phillips as manager of the Starrett New York Office. He became associated with the L. S. Starrett Co., in 1912, and was active in the formation and development of "the Nutmeggers," the well known organization of manufacturers' representatives, hardware and mill supply men in Connecticut. He is also a member of the Hartford Chapter of the American Society of Tool Engineers.

The Starrett New York Office remains at 53 Park Place, New York City.

PUBLISHING FIRM APPOINTS NEW EDITOR

Mr. Walter M. Mason, formerly with The Macmillan Company of New York City as Associate Editor in charge of books for elemen-

(Continued on page 47A)

HOW TO DRAW CARTOONS

[Match Stick Cartooning]

6 Instructional Films, based on the Visual Method originated by GENE BYRNES, creator of "Reg'lar Fellers." Drawings and Commentary by FRED COOPER, former art editor of Life. A series starting with the simplest forms of line drawing and developing through various stages to finished art expression.

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FIGURES (2 reels); **ACTION** (1 Reel); **HEADS & EXPRESSIONS** (2 Reels); **ANIMALS** (2 Reels); **HANDS, FEET, CLOTHING & DRAPES** (2 Reels); **COMPOSITION & STORY** (1 Reel).

A valuable contribution to basic art training as well as fascinating and amusing. In 16mm. Sound and Silent and Film Strips. Study Guides available. For rental and sale.

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No. 23 Grinder

No. 23 Grinder

Single or 3-phase geared motors operate spindles at just 500 r.p.m. 6" dia. x 2" face cup wheels — one fine, one coarse. Also high speed cone wheel for grinding gouges, and ½" high-speed wheel. Automatic coolant feed.

Here's the *safest* oilstone grinder for woodworking shops, — safe for tools, safe for the operator! Reduced wheel speed of 500 r.p.m. prevents burning of carbon steel used in fine hand tools, — also eliminates danger of flying emery and exploding wheels, common with cheaply-built high-speed units.

It's a Wallace quality-built product. Write today for bulletins — we also manufacture quality universal saws, jointers, bandsaws, lathes, mortisers, cut-off saws, glue pots, etc.

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35,000 R. P. M.
Weighs only
35 oz.

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STREAMLINED PLASTIC CASE

Practically indestructible case fits the hand and mounts in stand, vise, or lathe. *Guaranteed shockproof on AC or DC without ground wire.* For close jobs attach COOLFLEX Flexible Shaft which extends full power and speed to 9-oz. cool-running handpiece.

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THE PRECISE 35

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A New Approach to the Teaching of Drawing

DRAWING FOR LIFE AND INDUSTRY

By Daniel Green, B.S., M.A.
The Stout Institute, Menomonie, Wisconsin

- **Approaches Drawing Through Life Situations**
- **Emphasizes Basic Type Figures and Basic Relations Underlying All Drawing**
- **Utilizes the Project Method Accompanied by Instruction Sheets**
- **Excellently Illustrated**

Here is an approach to the teaching of drawing through *life situations* useful to the ordinary individual in his daily life; and from this beginning makes a transition to the fields of specialization.

It is arranged into major divisions of related material and presented in terms of projects. Each project, containing several problems, is given in complete instruction-sheet form. Each major division has a general discussion of material, preparing the student for the assigned projects. All material is generously illustrated.

Emphasis is given to basic type figures and basic relations underlying all drawing. The life situations chosen for this excellent new text exemplify these relations as well as material in the various fields of drawing.

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A new interest in industry is aroused for pupils in EXPLORING THE INDUSTRIES. This 160-page worktext for General Shop and the Laboratory of Industries, contains over 500 illustrative sketches, photographs, and drawings, thus making the contents and the directions easily understood by either junior or senior high school pupils who are in the first year of industrial arts. The material is planned for a full year's work and includes individual projects to provide outlets for the pupils' creative ability.

The authors are Chris H. Groneman and E. L. Williams, Department of Industrial Education, School of Engineering of Texas A. & M. College. Both men are well known for their work in the field of industrial education.

EXPLORING THE INDUSTRIES is new, thorough, and straightforward in its aim: to give the pupil a working knowledge of and an insight into industrial opportunities of today's world.

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THE **STECK** COMPANY

PUBLISHERS • AUSTIN, TEXAS

A USEFUL BOOKLET

ON SHARPENING and CARE OF BITS

We'll gladly send you, free, for your wood working instructors and their classes, copies of a useful booklet on sharpening and care of auger bits. Booklet also describes certain Russell Jennings special bits, and gives other information. In light of the present vital need to make tools do their best and last longest, you will find this booklet very valuable.

Russell Jennings AUGER BITS

THE RUSSELL JENNINGS MFG. CO., CHESTER, CONN.

(Continued from page 44A)

tary schools, has recently been appointed as Editor-in-Chief of The McCormick-Mathers Publishing Company. The home office of this company is in Wichita, Kans., with branch offices in Columbus, Ohio, and Atlanta, Ga.

OPEN NEW STORE AND PLANT

The John R. Cassell Co., Inc., have moved their retail store and photo offset printing plant to 138 East 47th St., New York City.

This firm represents the Frederick Post Co., of Chicago, Ill., and also handles some of the products of the Engineering Sales Co., of Sheboygan, Wis.

SHELDON AWARDED ARMY-NAVY "E"

The Sheldon Machine Co., Inc., 4258 North Knox Ave., Chicago, Ill., on June 26, was awarded the Army-Navy "E" award for excellence in war production.

This company manufactures lathes which are basic equipment on the Army's Mobile Machine Shops and Instrument Repair Shops, and in the Marine Corps Mobile Shop Trailers and on many naval craft.

WIN ARMY-NAVY "E" AWARD

The workers at the Norton Pike Company, Littleton, N. H. (Division of Norton Co.), were presented with the Army-Navy "E" award on July 7, before an audience of distinguished guests, including Gov. Robert O. Blood.

This New England concern in the White Mountains produces oilstones and other abrasive specialties, formerly under the old Pike name, and now under the brand Norton abrasives.

Since the outbreak of the war, the plant's output has been increased until this year, 1944, it is about six times that of 1940. Most of this has gone to the armed forces, and to plants directly or indirectly serving the same causes.

Army-Navy Award for Third Time

Employees of Skilsaw, Inc., Chicago, manufacturers of portable electric tools, have received for the third time the Army-Navy Production Award for high achievement in the production of war materials. This third citation, received June 10 from Under Secretary of War Robert P. Patterson, adds a second white star to the company's "E" Flag as a symbol of continued contribution to the war effort.

New Publications

(Continued from page 41A)

and use of tools; shop geometry; sketching and dimensioning; blueprint notes; glossary; and charts and formulas.

Driver's Manual for Truck Owners, Superintendents of Fleets, and Drivers

Cloth, 158 pages, 5½ by 8¼ in., illustrated. Published by The White Motor Company, Cleveland 1, Ohio.

An excellent book for its purpose. It contains a diagram of the driver's responsibilities that is worth studying.

The book emphasizes the need of a preliminary inspection before each trip, then starting and taking off correctly, and carefully using good road and parking practices.

The section on correct care is especially valuable for those who want to get the most out of their automobiles and trucks.

The 38-page pamphlet on Suggestions for Driver Training issued by the same firm which publishes the manual just described is helpful in organizing meeting programs for the upgrading of truck drivers.

Lathe Operations

By Lewis E. King. Paper, 119 pages, 5⅜ by 8⅜ in., illustrated. Price, $1.75. The Macmillan Co., New York, N. Y.

A book on the essential information required by the beginner on the lathe. It contains a description of the back-geared screw-cutting lathe and shows how to grind the tools; determine speeds, feeds, and depth of cut; mounting the work; do straight, shoulder, and form turning; knurling; taper work; thread cutting; and drilling, boring, and reaming.

Twentieth Century Engineering

By C. H. S. Tupholme. Cloth, 199 pages, 5¾ by 9⅛ in., illustrated. Philosophical Library, New York, N. Y.

A book which is to open to the layman a door permitting him to enter into the realm of the engineer.

In nontechnical language the beginner is introduced to such subjects as: mechanical power, workshop processes, air conditioning and refrigeration, chemical and metallurgical engineering, electrical engineering, aircraft and physics.

Reading the Micrometer

Edited by Marvel Moore. Pamphlet, 12 pages, 3 by 5⅛ in. Published by The Perfect Circle Co., P.O. Box 331, Richmond, Ind.

A small job instructor training handbook on the use and care of micrometers. The book is primarily intended to be used by the publisher's educational department.

Ship Model Building

By Gene Johnson. Cloth, 242 pages, 6⅜ by 9⅜ in. Price, $2.50. Published by Cornell Maritime Press, New York City.

A book for the beginner. It contains about 750 illustrations and describes each step which the builder has to make in the completion of his model.

Watch and Make

By V. J. G. Woodason and Walter Buchler. Paper, 110 pages, 5¼ by 8¼ in., illustrated. Price, $1. Published by Useful Publications, 37, Aldwych, London, W.C.2, England.

A book on the construction and uses of scale model aircraft. It is quite comprehensive and has several good chapters on aircraft recognition in which models are viewed by direct observation,

(Continued on next page)

BOOKS for METAL SHOPS

METALWORK, TECHNOLOGY & PRACTICE

This book contains a wealth of usable information for those wishing to improve their knowledge of the metalworking fields and allied trades. It describes the tools, materials, and operations common to many metalworking occupations, including machine shop, automotive, aeronautical, metal pattern making, foundry, sheet metal, ornamental metalwork, electrical, metal building and other trades. Simple language. 662 illustrations. Modern HANDBOOK FOR METAL TRADES. 400 pps., 8 x 10½, $4. *Ludwig*

BLUEPRINT READING, CHECKING, TESTING

A blueprint reading procedure for the machine trades. Actual blueprint reproductions for interpretation by the student. 29 problems range in difficulty from simple notched block to complex drawings. Complete, $2. *Steinike*

ENGINE LATHE OPERATIONS

An instructional manual for beginners presenting a series of operational units. Charts and tables for the lathe operator included. Job sheets in blueprint form gives student opportunity to read technical drawings and to apply information he interprets to actual work on the lathe. $1.60. *Whipple and Baudek*

MACHINE SHOP PROJECTS

A collection of 25 practical projects selected to offer training in the basic machine operations and to require a minimum of material. Related topics for study and an up-to-date list of reference books are included. Blueprint of each job is given. 112 pps., $1. *Roy E. Knight*

SPUR GEARING

A brief simple treatment of the fundamentals for laying out gears. Practical help to anyone confronted with elementary gear problems. Drawings and photographs as well as several problems for solution. 64 pps., 72 cents. *W. M. Owen*

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BLOOMINGTON, ILLINOIS

351 EIGHTH AVE. SOUTH, MINNEAPOLIS 15, MINN.

(Continued from previous page)

or by looking at their reflection in a mirror. There are also pictures of some of the principal planes used by the fighting powers.

Laying Out for Boiler Makers and Plate Fabricators

Revised by George M. Davies. Cloth, 522 pages, 8⅞ by 11¼ in., illustrated. Price, $7. Simmons-Boardman Publishing Corp., New York City.

This is the fifth edition of a book which contains comprehensive and specific directions for the artisans who work with heavier metal plates in the fabrication of boilers, tanks, stacks, and similar items.

The book contains about 700 illustrations and presents numerous problems for the beginner as well as the journeyman mechanic.

Composite Aircraft Manufacture and Inspection

By Leno C. Michelon. Cloth, 547 pages, 8¼ by 11 in., illustrated. Price, $6. Harper and Brothers Publishers, New York City.

A comprehensive manual covering the materials and processes of manufacturing, and the methods of inspecting the materials and the work that go into aircraft.

Part I on materials discusses the metals, wood, plastics, and fabrics used in aircraft manufacture.

Part II explains the heat-treatment of metals, plating and finishing, and the production processes used.

Part III is on the subject of inspection.

The appendix contains a number of very useful tables.

Training for Victory — Radio

By R. E. Williams and Charles A. Scarlott. Cloth, 282 pages, 6⅝ by 9½ in., illustrated. Price, $1.48. American Book Co., New York, N. Y.

This is a combination volume of the author's Radio I and Radio II. The material was prepared to give high school students a good groundwork of the basic knowledge of the subject for the requirements put upon them by the present war and the future peace.

The material has been kept simple and as free of mathematics as can be safely done.

The appendix contains useful tables, formulas, and a glossary of radio and electrical terms.

Occupational Therapy

By Borghild Hansen. Price, 25 cents. The Occupational Index, Inc., New York University, New York 3, N. Y.

The fifth in a series of occupational booklets covering occupations in which postwar employment prospects are favorable. It covers the nature of the work, abilities and training, earnings, methods of entrance, geographical distribution of employment, and postwar prospects. Librarians, teachers, and students will be interested in this pamphlet.

Free Pamphlets on Vocational Guidance

Price, 25 cents. The Occupational Index, Inc., New York University, New York 3, N. Y.

Librarians, counselors, and others interested in vocational guidance will find useful material in the new 1944 list of free pamphlets on sixteen occupations, including the names and addresses of the publishers.

Occupations in Plastics

By Max Alpert. Price, 25 cents. The Occupational Index, Inc., New York University, New York 3, N. Y.

This folder includes brief descriptions of fifteen different jobs. It states, in concise form, the abilities and preparation required, the methods of getting a job, average earnings, and the manufacturing areas.

Supervised Student Farming Programs

A pamphlet entitled "Agricultural Project Planning" and another, "Supervised Farm Practice Planning," have been prepared for vocational agricultural instructors, and offer complete and concrete procedures for setting up such farming programs.

These pamphlets emphasize the need for supervised agricultural programs leading to establishment in farming. Detailed suggestions are given for the development of such a program, the role of the student, and the type of instruction.

Furniture

Cloth, 170 pages, 5⅜ by 8⅛ in., illustrated. Price, $1. Put out by the Century Furniture Co., Grand Rapids, Mich.

A very interesting, concise, but comprehensive dissertation on the various furniture periods, and about the masters whose names are associated with the styles that have come down to us from the past.

The book also contains a useful chronology of English, French, and American furniture styles, and a glossary.

A Practical Course in Horology

By Harold C. Kelly. Cloth, 192 pages, 5⅜ by 7¾ in., illustrated. Price, $2.75. The Manual Arts Press, Peoria, Ill.

Written by a man who is well known both as an expert in his field and as an excellent teacher, this work presents the theory and practice involved in the repairing of watches in a concise, clear cut manner.

The book also contains a glossary of terms.

Elementary Applied Electricity

By L. Raymond Smith. Cloth, 311 pages, 5 by 7⅝ in., illustrated. Price, $2. The McGraw-Hill Book Co., New York City.

Third edition of this book on elementary electricity. It is comprehensive, well illustrated, and contains numerous problems and topic suggestions for study and discussion.

Mechanical Drawing Including Blueprint Reading

By Arthur B. Babbitt and David J. Swartz. Cloth, 217 pages, 5¼ by 7½ in. Price, $1.20. Henry Holt and Co., Inc., 257 Fourth Ave., New York, N. Y.

A simple text introducing the beginner to the fundamentals of mechanical drawing as a basis for further advances into the trades and industries of today.

(Continued on page 51A)

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We have made a specialty of serving schools with their lumber needs. More than 50 years of experience in supplying lumber to school shops is your assurance that you will get quality lumber at the right price. Sixty-five percent of our lumber stock is under shed which means lumber that can be used immediately upon delivery.

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The new 1944 Gluing Guide, just printed, is a better teaching aid than ever before. It includes new chapters on the mechanics of resin and casein glue, common gluing faults and their remedies, how to choose between resin and casein glue, etc. Twenty-four pages illustrated.

You can use the Guide as a brief but thorough textbook on wood gluing with modern, improved resin and casein glues.

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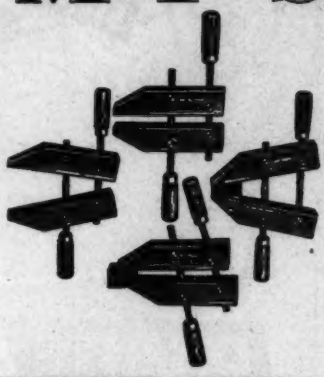

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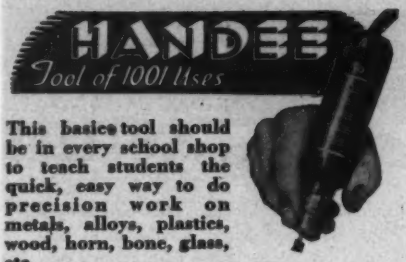

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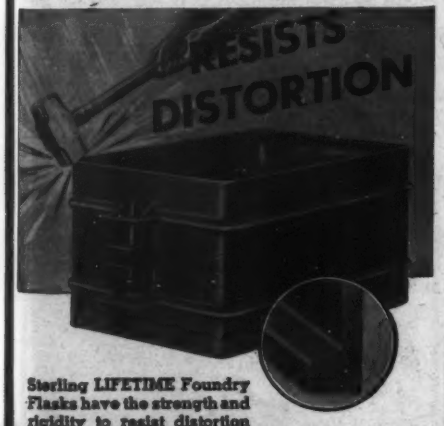

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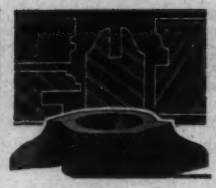

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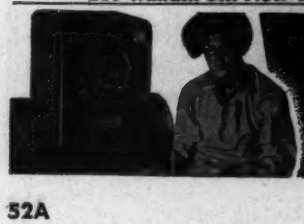

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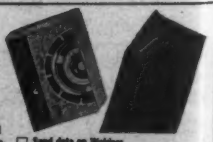

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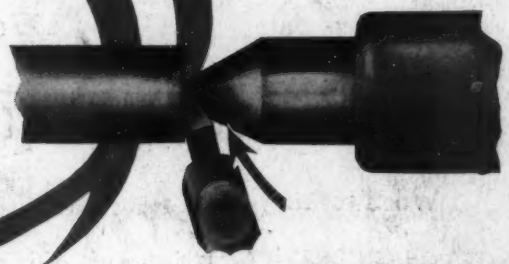
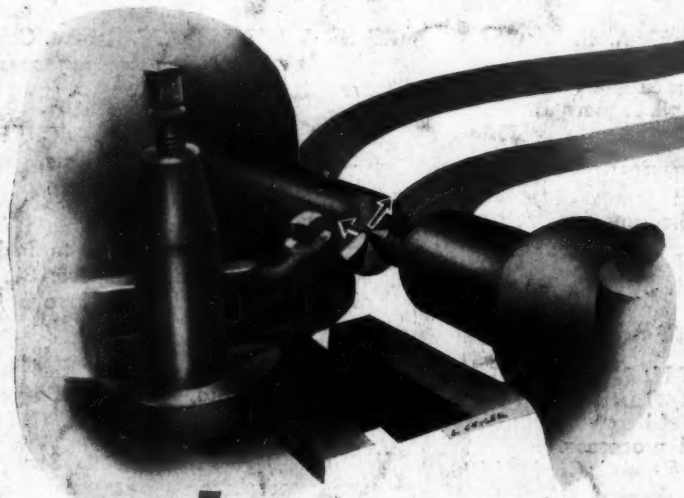
FACING TO LENGTH

Since facing is one of the most common lathe operations, most lathe hands figure they know all there is to know about it. It's not particularly difficult, but I've seen some good men go wrong on these points.

1. You'll save lots of time and effort if you'll keep handy an extra tailstock center that has been grooved or flat ground on the taper. This makes special tools unnecessary because it leaves room for a standard shape tool between work and center. Caution: Be sure flat surface is less than half way through point or it will act as a reamer.





2. For the finishing skim cut, *work from the inside out.* In other words, you start with tool point at the center hole and cut toward outside diameter of the piece with tool edge at slight angle with end of work.

3. Should chatter marks appear on the work, it is because work is running too fast, feed is too great, or angle of tool is too slight. All of these are easily corrected.

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